This is the sixth volume in the series Official Medical History of the Indian Armed Forces in the Second World War, 1939-45. A brief history of medical stores organisation in India since its inception in the last decade of the nineteenth century and its expansion during the Second World War to meet the heavy demands made on it during that period is given in the present volume.

The importance of medical services during turbulent years of the war needs to be stressed. It will not be an exaggeration to say that timely medical supplies and improvisations had a part to play in winning the war. The medical stores organisation had not only to meet the demands of the expanding Indian Army, but was also responsible for catering to the needs of the forces in the Middle East and the Far East. This cast a heavy burden on the medical stores organisation. But by planning, imagination and resourcefulness, difficulties were overcome and desired results achieved.

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IN THE SECOND WORLD WAR 1939-45

MEDICAL SERVICES

MEDICAL STORES AND EQUIPMENT

Edited by
B. L. RAINA,
LIEUT.-COLONEL, AMC

Director
BISHESHWAR PRASAD, D. LITT.

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GENERAL PREFACE

The present volume is sixth of the series dealing with the medical aspect of the activities of the Indian Armed Forces in the Second World War. The volumes of the medical series have been edited by Lieut.-Colonel B. L. Raina, AMC, Editor, Medical Series, and prepared by the Combined Inter-Services Historical Section. The Section had the benefit of the advice of Colonel M. K. Kelavkar and Colonel R. N. Khosla in preparing this volume dealing with Medical Stores Organisation. To both these gentlemen, I am greatly indebted for the labour of love which they rendered in the completion of this volume.

The Government of India established an organisation before the conclusion of the Second World War to collect material for the writing of the history of operations in which Indian armed forces had participated. This organisation grew into the War Department Historical Section which on the partition of India in 1947 was renamed the Combined Inter-Services Historical Section, India and Pakistan, and was to continue as a joint venture of the two Governments. The Section was asked to produce a history of military operations and organisational activities relating to the Second World War. The medical series form a part of the general scheme outlined by the section.

In the medical series an effort has been made to reconcile the requirements of the specialists with the needs of the general reader. The main purpose is to describe the activity of the Indian Army medical services during the Second World War. It is hoped that these volumes would inspire medical profession to emulate their predecessors and excel their record in the past.

I am grateful to Lieut.-General C. C. Kapila, Director General, Armed Forces Medical Services, for writing a foreword to this volume and to Lieut.-Colonel B. L. Raina who has edited the volume.

March, 1963 **Bisheshwar Prasad**

FOREWORD

In the medical series volumes of which Medical Stores and Equipment is a part, a connected account has been given of the activities of the medical services of the armed forces of India during the Second World War. This is the first attempt of its kind to produce an authentic account of the work of the medical services during the great global war.

The medical stores organisation in India under the DGIMS was instituted originally for military stores only. Later, its scope was extended to include civil departments also. Gradually non-government institutions were also supplied with medical stores by this organisation. Just before the outbreak of hostilities in 1939 the civil commitments of the medical stores organisation were greater than the military. The arrangement for the supply of medical stores was peculiar. The DGIMS operated an organisation, paid from the defence estimates but concerned predominantly with civil needs. He performed all the supply functions (provisioning, stocking and distribution), and not only purchased the medical stores, both in India and abroad, but also manufactured some stores in his depots. The DMS controlled the seven Medical Mobilisation Stores located at Rawalpindi, Peshawar, Quetta, Lahore, Lucknow, Meerut and Poona, where the equipment and stores received from the Medical Stores Depots of the DGIMS were stocked for the field medical units, and kept ready for the immediate needs of mobilisation. These arrangements did not prove satisfactory to meet the needs during war.

In 1943, the Medical Stores Department was divided into two different branches, civil and military. The former, under the control of the DGIMS, was to provide for the civilian needs of the country, as well as the military requirements of the overseas theatres of war in the Eastern Group countries. The latter, under the control of the DMS, was to serve the needs of the armed forces in India. Such a transfer from the DGIMS to DMS led to the assumption by the DMS of functions like Standardisation, Calculation of statistics, Provisioning, Procurement, Inspection, Distribution and Stores administration.

By October, 1945, 1,163 medical units had been raised and 1,97,539 hospital beds equipped in India. About five million casualties were treated in the hospitals. The supply of medical stores and equipment on a large scale created problems which were boldly tackled and overcome. Shortages of medical manpower, equipment and stores were experienced and this necessitated improvisations and flexibility in approach and methods. It was generally felt that the Medical Directorate had not been vested with adequate authority for taking quick decisions. The difficulties and shortcomings faced and measures taken to remove them should help and guide the medical services in similar situations and exigencies.

I am grateful to the CIS Historical Section for preparing the volume and Lieut.-Colonel B. L. Raina, AMC, for editing it.

New Delhi,
16 April, 1963.

(C. C. KAPILA)
Lieut.-General, DGAFMS

PREFACE

The main aim of Stores organisation in peace or war is to supply expeditiously the medical stores and equipment when and where they are most needed in an economical way. World War II witnessed the emergence of two separate organizations one wholly under military control and the other under civil administration. This monograph records the impact of war on medical stores organization and the measures taken to meet the increasing demands upon it during the first few years of war.

War creates many problems and increases peace-time responsibilities—risks of infectious diseases and epidemics due to overcrowding, movement of troops and population, mental overstrain, increased fatigue, undernourishment, lowering of bodily resistance, increased demands of medical manpower, additional hospital beds and other medical and health services and consequently urgent and increased requirements of medical stores and equipment. Smooth functioning and rapid expansion of organised public health, environmental hygiene and health services, family welfare, school health and prevention of diseases become urgent. It becomes imperative to co-ordinate varied civilian medical and health services and their needs like school health (Ministry of Education), industrial health (Ministry of Labour), medical services of railway employees (Ministry of Railways), health services of Centrally administered areas (Ministry of Home Affairs), special Centrally administered areas (Ministry of External Affairs), health services of the States (State Governments), special projects like building roads and for rehabilitation (Ministry of Housing and Rehabilitation), provision of food and supplements to meet the needs, especially for vulnerable groups, expectant mothers and children (Ministry of Food), production of medical stores and equipment to meet the needs of various agencies, provision of medical man-power and medical stores and equipment to meet the need of both civil and defence and other agencies, mobilisation of resources of voluntary agencies like the Indian Red Cross Society and Joint War Organization. The store organization problems like other similar problems thus suddenly increased are mainly those of: (i) maintenance of peace-time health services in war situation, (ii) provision to meet the needs of the Armed Forces, and (iii) Civil Defence.

The DGIMS was, therefore, required to: (i) initiate co-ordination of activities in the field of health, (ii) assist directly, wherever necessary in meeting the needs, (iii) take action directly in fields like (a) emergency organizational and administrative cell in his own Directorate; (b) decentralised administrative and financial authority which would give him and his officers powers to take immediate decisions without normal delays; (c) settle with concurrence of administrative authorities financial responsibilities for meeting the needs of State Governments and other agencies for the provision of stores and equipment for emergent demands. Inter-departmental discussions had to be arranged to review local resources, governmental, local body and voluntary organizations, hospital beds available, room for crisis expansion, transport, laboratory facilities, drugs, dressings, hygiene, stores, hospital equipment, resuscitation and surgical facilities, means of communication, distances, means and time involved in despatching stores and equipment and evacuation of casualties.

A variety of requirements had to be assessed and expert committees formed, e.g., requirements of casualty stores, namely personnel, equipment, equipment for First Aid parties, equipment for First Aid Posts, Ambulance equipment, ambulance cars, hospital bed equipment, transport for evacuation and treatment of casualties, casualty receiving hospitals, base-hospitals, special units like transfusion, physio-therapy, orthopaedic, etc., provision of medical staff for strengthening civil organization and Civil Defence organization, provision of vaccine and sera and establishment of reserve depot medical stores, Blood Transfusion schemes including crystaloids and surgical facilities, arrangements for safety of radium, etc., arrangements for emergency lighting, arrangements for communication between medical units for equipment and casualties, dissemination of information on Geneva Conventions, including protection of medical institutions and personnel, arrangements for reception and maintenance of evacuees and health problems associated with movement of civil population, maintenance of city conservancy and disposal of the dead, domestic conservancy, protection and augmentation of water supply, arrangement of sanitary service under conditions of disorganization, essential supplies for conservancy equipment including vehicles, special arrangements of PWD labour especially those employed on military projects, close liaison with health measures for civil contract labour employed by the military, health problems of civil population in areas of concentration troops including aerodromes, control of diseases along routes of military traffic, treatment of military personnel in civil hospitals, arrangements designed to improve existing food standards and supplies for civil population including expectant mothers and children, review of medical manpower, location of manpower for the civil and defence needs and expansion of training programme to meet the manpower needs. The above mentioned activities require provision of stores and equipment of some type or the other.

It became necessary to consider subjects like (a) location of manufacturing concerns in India of (i) medical equipment, (ii) chemicals and drugs, etc., (iii) surgical equipment, (iv) diagnostic equipment, (v) surgical instruments, (vi) vaccine and sera, (b) indigenous resources, indigenous production wholly and partly with imported material, (c) the exent to which the output could be increased at a short notice with or without any additional plant from abroad, (d) imported drugs: essential drugs, readily available, essential for certain purposes but not for others, new items, (e) reduction of PVMS items and review to stimulate their production from indigenous resources, (f) notification of stocks of essential drugs held by important dealers—so that they could be mobilised wherever required, (g) turnover of reserves.

Assistance was required from not only research institutions like I.C.M.R. but from all possible sources—(i) the Central Board of Revenue for opium products, (ii) The Council of Agricultural Research for biological products, and locating sources for growing of drugs, (iii) the Inspector General of Forests for drugs like creosote guacocol, (iv) the Geological Survey of India for minerals, (v) Private Pharmaceutical concerns. It was obviously necessary to explore new items and substitutes—and their development. Specialised units had to be formed to meet emergent requirements. Health Intelligence had to be developed including epidemiological intelligence from all over India so that the requirements can be identified and measures taken to meet them. Price control and quality control required special attention.

The above brief reference to some of the problems of medical stores and equipment had been made to indicate the complexity and highly specialised nature of the Stores organization. This monograph discusses the scope of activities of the medical store department, production of medical and surgical instruments and equipment, emergence of Army Medical Stores Organization, supplies overseas, economy and control measures adopted, procurement activities, investigation of sources of supply, development of Indian Pharmaceutical industry, production of surgical instruments in India and allied subjects.

The monograph emphasises the necessity to develop in peace-time capacity to produce medical stores and equipment from indigenous sources, co-ordination of activities of varied agencies, the need for smooth organizational and administrative structure, the requirement of a pool of officers trained in medical stores organization which is a highly specialised organization, early provisioning, standardization and inspection, facilities for storage and rapid procurement and distribution.

The monograph has been mainly compiled by Colonel M. K. Kelavkar. It was revised by Colonel R. N. Khosla to whom my grateful thanks are due. Gratitude is also due to Lieut.-General S. P. Bhatia for his valuable assistance in preparation of this monograph and the Chapter on Medical Stores and Equipment Volume I, entitled Administration Medical History series.

B. L. RAINA,
Lieut.- Colonel
Editor.

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ABBREVIATIONS

ACP	Assistant Controller of Purchase.
ADG	Assistant Director General.
ADGIMS	Assistant Director General Indian Medical Service.
ADMS	Assistant Director of Medical Services.
AG	Adjutant General.
ARP	Air Raid Precautions.
BP	British Pharmacopoeia.
BPC	British Pharmacopoeia Codex.
CCI	Chief Controller of Imports.
CCS	Casualty Clearing Station.
CGI	Controller General of Inspection.
CIGS	Chief of the Imperial General Staff.
CPO	Central Provision Office.
DACP	Deputy Assistant Controller of Purchase.
DADG	Deputy Assistant Director General.
DCP	Deputy Controller of Purchase.
DFA	Deputy Financial Adviser.
DGIMS	Director General Indian Medical Service.
DGISD	Director General Indian Stores Department.
DMS	Director of Medical Services.
GHQ	General Headquarters.
HMG	His Majesty's Government.
IMD	Indian Medical Department.
IMS	Indian Medical Service.
IRFA	Indian Research Fund Association.
LPO	Local Provision Office.
MAG	Military Accountant General.
MDS	Main Dressing Station.
MGO	Master General of Ordnance.
MME	Medical Mobilization Equipment.
MSD	Medical Stores Department.
NWFP	North Western Frontier Province.
PVMS	Priced Vocabulary of Medical Stores.
QMG	Quarter Master General.
U.K.	United Kingdom.
U.S.A.	United States of America.

CHAPTER I

Introduction

MEDICAL STORES DEPARTMENT GOVERNMENT OF INDIA

India depended during World War II for her medical supplies on private industry, imports and manufacture by the Government's own Medical Stores Department. This department played a very important part during both the World Wars and in the interwar period. Up to 1943, it was essentially a part of the organisation of the army in India financed from Army Estimates and existed as a special department primarily for ensuring medical and veterinary supplies of adequate quality and of approved pattern to military and veterinary hospitals and field medical units of the army in India in peace and war. The department also supplied medical stores to civil hospitals and dispensaries. For this dual purpose Medical Store Depots were maintained in five centres, viz., Madras, Bombay, Calcutta, Lahore and Rangoon.

Each Medical Store Depot was under an IMS Officer assisted by one or more military assistant or sub-assistant surgeons and a civilian staff, (storesmen, clerks, compounders, etc.). The control of the Medical Stores Department had been vested in the Director General, Indian Medical Service (DGIMS) who in conjunction with the Director of Medical Services (DMS) in India, was responsible to the Defence Department of the Government of India for the supply of all military medical stores. After the separation of Burma from India in 1937 the depot at Rangoon reverted to the Government of Burma. DGIMS was also responsible to the Government of India for the supply of medical stores to the civil government and government-aided hospitals and institutions and non-government civil hospitals, Indian States, railways, charitable institutions, etc. Thus although primarily a part of the military organisation, nearly three-fourths of the work of the department lay in peace time in the supply of drugs, surgical instruments and appliances to non-military institutions.

The depots at Madras and Bombay had factories attached to them. These factories were of great importance during war as they manufactured most of the pills and tablets for field use and turned out finest field and other special dressings. The Medical Stores Department thus was not only the largest importer in India of medical stores but also one of the biggest manufacturers of drugs and dressings. At Madras the Medical Store Depot also undertook the repair of surgical instruments and appliances.

At each of the manufacturing depots there was a highly qualified and experienced chemist who tested and standardised all preparations turned out in the factory. He was assisted by trained assistants. In the administration and management of Medical Store Depots and factories, DGIMS was assisted and advised by an Assistant Director General (ADG).

Since the inception of the Medical Stores Department about 1894 the department has always remained under the control of DGIMS. He was for this purpose responsible to the Defence Department till April 1941 and later to the Supply Department, when this organisation passed to the control of that department in June 1943.

The story of the trials and tribulations through which the Medical Stores Department passed in World War II is a long one. There were constant changes in the administration, organisation, audit and accounting, system of procurement, etc., and also frequent changes in the authorised scales of equipment of military units. All this led to various problems and made the smooth running of the department at times very difficult.

Medical stores required for all purposes including civil and military, were stocked together in the depots during peace and the first three years of the war. In August 1941, the " Principal Staff Officers' Committee for the Provision of Medical Stores and Personnel during War " recommended that the DMS should undertake the whole function of provisioning of medical stores required by the Army and DGIMS to continue to hold stores. To implement this recommendation, the stocks in the depots were distinctly distinguished as civil and military. Separate ledger cards were then introduced but no physical separation was made at first. Further division of stores was introduced when the Central Provision Office (CPO) dealing with supplies to Eastern Group countries and overseas theatres of war was formed. As soon as stocks were divided into their respective categories the depots were asked to submit stock reports of military stores to the DMS to enable him to establish a central stock control branch in his office for the correct stock accounting of the military portion of the stores. From 1 September 1941, all copies of receipt and issue transactions had to be sent to the DMS to enable him to keep his ledgers up-to-date. This scheme did not prove to be a success and had to be discontinued. Instead, the depots, were asked to furnish monthly and quarterly stock reports of military stores on special proforma showing " stocks in hand", " dues in " and " dues out " to the DMS. This scheme also proved unsatisfactory and ultimately in response to the desire of the DMS to control his own stores, these were transferred to the newly formed Army Medical Stores. This had to be done piecemeal in stages, when the war was in full swing and was completed only in 1943. For this purpose DGIMS had to part with a large proportion of the accommodation at various places and also the corresponding staff.

As these stores were kept apart from main depots in various hired buildings, physical transfer of these stores to the army produced a good deal of dislocation in the accounting and other work of the depots.

There is no doubt that a good deal of the trouble and the difficulties mentioned above would have been avoided if there was one controlling authority for all the work of the medical stores instead of two. It would have, perhaps, been simpler if the DMS was permitted to take over the whole organisation at the commencement of the war thus avoiding serious dislocation and extra expense.

Thus in 1943, the Government Medical Stores Department was divided into two different independent branches, civil and military. The former under the control of the DGIMS was to cater for the needs of the civil in India and the military needs of the oveseas theatres of war in the Eastern Group Countries. The latter under the control of the DMS was to serve the needs of the Armed Forces in India. This narrative on stores and equipment deals with the period up to the taking over of stores required for military purposes by the DMS and the activities of the civil side of the Medical Stores Organisation throughout World War II in so far as supplies to overseas theatres of war were concerned.[1]

Prior to September 1939 the Medical Stores Department held a mobilisation reserve for the needs of the Armed Forces, (3/5th at Lahore Cantonment Depot and 2/5th at Bombay Depot). Depot at Lahore also held complete equipment of two Base Depots. This mobilisation reserve as well as the mobilisation stores held at the Army Medical Mobilisation Stores were constantly turned over by the Medical Stores Department chiefly by issues to the civil. To replenish the War Reserve there existed a scheme of Standing War Indent to provide for regular periodic replenishment. On general mobilisation Lahore Depot was earmarked for expansion into a Reserve Base Depot of Medical Stores.

The average annual issues of the Medical Stores Department to the army during peace time amounted from 9 to 11 lakhs of rupees and to the civil institutions about 35 lakhs. Considerable assistance to the Army Estimates was obtained by payment from the civil institutions, as the Defence Department recovered Rs. 5 to 6 lakhs every year from the civil for departmental charges. If the Defence Department had desired to run the department purely for army purposes and civil custom had not existed, they would have had to pay considerably more to maintain an organisation constituting a valuable potential war reserve. The civil institutions also helped considerably in the constant turnover of the mobilisation reserve, thereby saving considerable loss due to deterioration. The enormous output of drug factories where expensive machinery was installed originally to supply the needs of the army during war was made full use of by issues to the civil in peace time.

The number of civil institutions supplied by the Medical Stores Department had increased so considerably that it was found impracticable to set a hard and fast limit to the total quantities of working stocks of drugs and equipment. The needs of the civil departments were found to be variable while the amount for the military institutions was on authorised scales. The varying civil demands could be ascribed to the prevalence of different diseases requiring different drugs for their treatment from year to year and the growth of medical knowledge resulting in changes in the medical officers' preferences and leading to constant alterations in articles demanded.

For a few years prior to 1939, the military financial authorities had considerably reduced the budget of the medical stores. The department was, therefore, greatly handicapped at the commencement of the war due to large reduction of working stocks.

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[1] Also see our *Official History of the Indian Armed Forces, Medical Series, Administration,* Chapter XV.

SURVEY OF ACTIVITIES OF THE MEDICAL STORES DEPARTMENT PRIOR TO THE WORLD WAR II

Originally Medical Store Depots were under the control of the local Surgeons General of the Provinces in which they were located. In 1894, these were taken over by the Government of India. Medical Stores Department at first supplied the needs of military hospitals. In course of time the sphere of activity of the department was extended. The provincial civil medical departments turned to them as sources of supply because they found that they were paying high prices for imported stores in open market and that non-compliance or partial compliance of orders on the trade resulted in the institutions being often gravely inconvenienced. This example was followed by many municipal and district bodies and Indian States. Civil institutions always felt that they derived the advantage of getting fresh supplies at regular intervals, which enabled them to dispense with the necessity of their holding large stocks with risk of deterioration and to regulate their financial commitments and budgets. The army on account of turnover effected by regulated supplies to the civil customers, was able to obtain fresh stores for military hospitals and was also able to recover much of the expense of overhead charges comprising establishments, buildings, machinery, interest on capital and store-keeping.

The depots at Madras and Bombay gradually commenced the preparation of pharmaceutical drugs and the manufacture of instruments and appliances. As India and the neighbouring countries furnished a large proportion of the raw materials from which drugs were made, it was obviously cheaper to prepare the finished products in India from indigenous raw materials than to import them. This increased considerably the manufacture of surgical instruments, appliances and drugs for which purpose large factories were built at Bombay and Madras depots and small one at Lahore.

In 1910, a conference of the Officers-in-Charge Medical Store Depots, was held in order to decide whether the Government of India was getting a fair return for the money spent on Medical Store Depots and whether, assuming that they were profitable institutions, the policy was defensible, in view of the extension in India of the activities of the trade. The conference was unanimously of the opinion, that any restriction on the growth of the department would be unsound from the financial point of view, which opinion was fully justified in subsequent years. The financial review of the working of the depots for the year 1913-14, revealed a profit of Rs. 3,09,474. The value of composite articles (with imported ingredients) manufactured in the factories amounted to Rs. 3·29 lakhs.

It was proposed sometime before the outbreak of World War I that stocks at Medical Store Depots should be reduced in order to save interest on funds locked up. Fortunately, this proposal did not materialise. When the war broke out, the Medical Stores Department held two years' stock of imported and one year's stock of locally-purchased items.

Throughout the War of 1914-18 the work of supplying medical stores to the army in India, to overseas forces and to civil institutions proceeded smoothly, largely due to the increased output of the factories at Madras and Bombay depots. At the end of 1915 extraordinarily heavy demands were received from Mesopotamia resulting in extensive purchasing in India which made it possible to meet all demands without delay.

In 1916, a Base Depot of Medical Stores was mobilised at Bombay for despatch to Basra to supply five divisions in the field and was entirely equipped from the Medical Stores Department and staffed by three experienced IMS officers and several assistant surgeons. The depot was despatched from Bombay to Basra with several hundred tons of stores within about a fortnight of the receipt of orders and served in Mesopotamia as the sole source of supply of medical stores in that country until January 1917, when it was relieved by a British unit.

In February 1916, the manufacture of first field dressings was undertaken by the Medical Store Depot, Madras. In all 90,000 dressings were turned out in the first nine months and a total of 3,16,000 dressings up to the end of March 1920.

In February 1917, a further demand was made on the resources of the Medical Stores Department by the decision of the Government of India that all schools, colleges, laboratories and other scientific institutions which formerly submitted their indents to the Director General, Indian Store Department, London, should in future obtain their supplies of such articles as were stocked at these depots but not obtainable in the local market from them.

During 1917, several ships conveying medical stores to India were sunk by enemy submarines and orders were issued by the government that utmost effort should be made to utilise local products as a result of which many drugs, instruments, appliances, etc., were obtained in India. At this time the production of depot factories increased considerably both in regard to the quantity and variety of articles manufactured and the department was able to fulfil all civil and military requirements. It was also found at this time that instruments and appliances obtained from Indian firms were not of the required material and workmanship, due mainly to the difficulty in obtaining steel and other materials of the proper quality.

The figures given below show the expansion of Indian troops for whose needs the Medical Store Depots were responsible in World War I.

	Pre-war strength	*Enlisted during the war*	*Sent Overseas*
Men	2,40,000	11,50,000	9,50,000

The following is a statement showing the number of new field medical units, the equipment of which was provided and fitted up by the Medical Store Depots at Bombay, Madras, Calcutta and Lahore during the War of 1914-18:—

Field Ambulances	.. 253 Sections
Casualty Clearing Stations ..	.. 93 Sections
Staging Sections	.. 116 Sections
Sanitary Sections	.. 31 Sections
General Hospitals	.. 258 Sections
Advance Depots of Medical Stores ..	.. 13 Depots
Base Depots of Medical Stores ..	.. 1¼ Depots

Following table gives an idea of the amount of work done at the depots from 1914-20:–

Year	Number of indents dealt with	Production of factories in lbs.	Amount expended on local purchase of stores
		lbs.	Rs.
1914–15	13,093	8,93,019	6,74,511
1915–16	15,481	17,86,961	10,67,106
1916–17	16,347	11,92,534	30,31,942
1917–18	18,052	10,30,646	37,92,563
1918–19	22,391	11,07,334	33,35,328
1919–20	19,690	13,22,641	30,19,829

War with Afghanistan in 1919 threw enormous amount of work on the Medical Stores Department requiring full supply of medical stores to a force of 3,40,000 men and 1,58,000 animals. For this force, 29 Field Ambulances, 12 Casualty Clearing Stations, 15 Staging Sections, 15 Sanitary Sections, 8 Advance Depots of Medical Stores, 1,00,000 hospital beds in General Hospital and 11 Ambulance Trains were mobilised.

It was at times necessary to restrict issues to civil institutions of articles urgently needed for military purposes or of articles the export of which from the United Kingdom was prohibited. Many civil institutions which formerly made their own arrangements for medical supplies applied during the war for permission to deal with the Medical Stores Department and, in most instances, this was given.

In 1919, the Government of India set up the " Medical Services Committee " to inquire into, among other matters connected with the medical services, the question of the reorganisation of the Medical Stores Department. The main findings of the Committee were:—

(i) The necessity for extension and improved accommodation in the depots and the development of manufacture and the pioneering of industries in connection with preparation from indigenous products.

(ii) Closure of the laboratory and the small factory at Lahore Depot and its transfer to Madras or Bombay.

(iii) Need in the improvement of status and emoluments, leave, etc., of Medical Store Keepers who had to do arduous work and the change of designation to that of Officers-in-Charge, Medical Store Depots.
(iv) Desirability of employment of military Assistant Surgeons in Medical Store Depots.
(v) Need of research and employment of pharmaceutical chemists in certain depots.
(vi) Need of a Deputy Director General (Stores) in the Office of DGIMS, in addition to an Assistant Director General.
(vii) Complete verification of all stocks held in the Medical Store Depots at least once in every three years.

The experience of the War of 1914-18 had raised the problem of what mobilisation reserve of medical stores should be held in India to cope with a similar situation in the future. It was decided in 1921 that the Army Medical Mobilisation Stores should hold a complete set of equipment for the following units of the field army which might be mobilised on the outbreak of war:—

(a)	Field Ambulances	27
(b)	Casualty Clearing Stations	9
(c)	British Staging Sections	26
(d)	Indian Staging Sections	36
(e)	Sanitary Sections	11
(f)	Advance Depot Medical Stores	7
(g)	British General Hospitals	7
(h)	Indian General Hospitals	16

The maintenance of these units after mobilisation so far as medical stores were concerned also rested with the Medical Stores Department which was to maintain a 20 per cent. reserve of initial equipment of medical stores for units mobilising in the first two months of the declaration of the war.

To secure maintenance after the first two months, it was decided that it would be necessary for the Medical Stores Department to prepare beforehand and supply to the High Commissioner in the United Kingdom and other purchasing officers in India, definite lists of articles and quantities required on mobilisation of forces with an estimation of the period in which the supply was required so that anticipatory agreements might be entered into with the supplying firms. These lists were known as the *Standing War Indent* which was revised from time to time and finally before the commencement of World War II.

MEDICAL STORES DEPARTMENT REORGANISATION COMMITTEE

In January 1939, a Committee was appointed by the Government of India to consider various matters in connection with the reorganisation of the Medical Stores Department with the main object of economical provisioning of medical stores in peace and war for the army and the concurrent supply of civil requirements, under the chairmanship of DGIMS.[2]

[2] A summary of findings and recommendations of the Committee is given in Appendix I.

Although most of the recommendations were promptly given effect to, the advent of the war in September 1939 changed the whole position.

This Committee based its findings on the fundamental fact that civil custom overtopped military in the ratio of 5:2. The Committee not only recommended that civil custom should be retained by the Medical Stores Department, but that if possible it should be augmented and that no attempt should be made by the Government to reduce such custom.

POSITION OF THE MEDICAL STORES DEPARTMENT AT THE OUTBREAK OF WORLD WAR II INCLUDING STOCK POSITION AND PREPAREDNESS TO MEET WAR COMMITMENTS

On 3 September 1939, the Medical Stores Department in addition to normal peace-time supplies of stores had the following additional commitments:—

(i) Supplies of reserves for expeditionary forces already located in the Middle and Far East and compliance with their monthly indents. This was a colossal task especially as both indigenous and imported stores were being supplied to both the Middle East and Far East for sometime after the commencement of the war. The position was revised towards the end of 1940 when supplies to Far East were confined to indigenous stores only.

(ii) Construction and fitting up to the latest mobilisation equipment scales new panniers, field boxes, etc., for field medical units in replacement of those taken by units proceeding overseas with Expeditionary Defence Troops (Fish Schemes). These units were being supplied in the first instance from the Medical Mobilisation Stores, out of the equipment for the Pink Plan (Plan of Operations, 1938).

(iii) Fitting up Hospital Ships, Ambulance Trains, etc.

(iv) Anti-gas medical equipment for overseas—21 groups each at Bombay and Lahore.

(v) Sick Bay Equipment at the ports of Bombay, Madras, Karachi and Calcutta (about 69 sets).

Equipment for (i) and (ii) above could not be supplied from the normal stocks of the Medical Store Depots and purchases from the trade had to be freely made. In addition, stores from the mobilisation war reserves which were meant for field equipment only had to be utilised. Units in Egypt and Singapore were also demanding ordinary peace stores in addition to and in substitution of stores issued. These unusual overseas demands threatened seriously to deplete the resources and stocks of Medical Store Depots.

At the outbreak of World War II the position was not exactly the same as in World War I. The Indian army was expanding at a far more rapid rate than during 1914-18 and control had been vested in India to a greater extent.

At the commencement of World War II the margin of safety was far less than it was in 1914. During the few years immediately preceding World War II there had been a pruning down of the budget provision of the Medical Stores Department with the result that not only had excess stock, over and above the permissible quantity, been eliminated but also, apart from the revised maintenance of six months' imported and two months' locally purchased working stocks, it had been found that the sums provided were inadequate to meet even the current demands of military and civil customers. In practice, this meant that the civil customers had to go short.

In January 1939, on the urgent representation of the DGIMS a sum of Rs. 5 lakhs (in addition to Rs. 24 lakhs already sanctioned for the year 1938-39 for local stores) was provided to correct the adverse stock position so as to enable the department (a) to meet current civil demands, (b) to replace stocks expended on the Waziristan Expedition (1936-37) and (c) to increase stocks of locally purchased stores from two to three months' supply. By September 1939 this sum of Rs. 5 lakhs had been completely spent. Part of the stores received and purchased had already been issued in the normal transactions of the department.

Some months before the war broke out, the Advisory Council of the Principal Supply Officers' Committee had recommended that the normal peace-time stocks of stores purchased locally but made from imported materials should be increased from three months' to six months' working stocks. Sanction for this was received in the month of October 1939 and the depots got busy laying in these stocks, the prices of which had in many cases risen considerably.

The position, therefore, at the outbreak of the war was that the department had in stock six months' supply of stores purchased abroad and two months' of locally purchased stores (based on the average expenditure for the previous three peace-time years) less supplies, which had been issued for the use of expeditionary forces sent out of India before the outbreak of the war. In addition to these stocks, the Medical Store Depots maintained one month's supplies of expendable equipment of the mobilisable medical units, and were busy adding to their stocks of locally purchased stores imported materials to raise them from three to six months' stocks.

MOBILISATION RESERVES

Nucleus of War Reserves: For the following field medical units to be mobilised on the outbreak of war complete sets of equipment were held at the army medical mobilisation stores:–

(a)	Field Ambulances	21
(b)	Cavalry Field Ambulances	3
(c)	Casualty Clearing Stations	5
(d)	British Staging Sections	6
(e)	Indian Staging Sections	13
(f)	Field Hygiene Sections	11
(g)	Advance Depot Medical Stores	7
(h)	General Hospitals	13

The Medical Stores Department was responsible for the maintenance of medical stores of the field medical units after mobilisation. To tide over the supply to these units for the preliminary period of approximately one or two months of the war, the depots at Lahore and Bombay held a mobilisation reserve of medical stores in proportion of 3/5ths and 2/5ths respectively.

Replenishment of this nucleus of war reserve in the Medical Store Depots on mobilisation was secured by the Standing War Indent Scheme referred to hereafter.

In addition to the mobilisation reserve held at Lahore and at Bombay, perishable articles required on mobilisation were held on checked indents and kept in reserve in the various Medical Store Depots. Medical Store Depots were responsible for seeing that all this special mobilisation reserve was kept entirely separate and not encroached upon for any purpose, and that it was also turned over twice yearly, kept fit and ready for issue at all times.

Stock Lag Indent: Medical Stores Department maintained in peace a nucleus of war reserve of army medical stores intended as first replacements for field medical units, the expendable stocks of which were expected to tide over the first one or two months of war. This was not considered good enough and in 1938 the DMS in consultation with the DG IMS compiled a list of stores valued at Rs. 22 lakhs to build up a five months' war reserve for field equipment. This was cut down to Rs. 7 lakhs by the financial authorities. In June 1939, orders to the value of Rs. 7 lakhs were placed for stores, both imported and locally purchased including anti-gas stores with the object of laying in stocks to further augment the nucleus of war reserve. This indent was known as the "*Stock Lag Indent.*" Excepting a few items which could be purchased in India, all the rest were ordered from the Director General, India Store Department, London. The normal time required for the supply of an indent of this magnitude in peace time was about six months. On 22 September 1939, the position as reported from London was as follows:—

> "Stock Lag Indent practically ordered. Part shipped, balance being shipped earliest opportunity."

Standing War Indents: During peace certain standing war indents on India Store Department, London, were held for the medical requirements of the Indian army on mobilisation. The indents were meant to secure the continued maintenance of the equipment of field medical units of the covering troops.

The stores on the standing war indents consisted of two lists as detailed below:—

LIST I

(a) Sera
(b) Drugs and Chemicals
(c) Dental Equipment
(d) X-ray Stores
(e) Instruments, Appliances, Dressings and Sundry Stores

LIST II

(a) Laboratory Equipment
(b) Special RAF Equipment
(c) Anti-gas Stores

Director General, India Store Department cabled from London, on 8 October 1939, that the standing war indents had been taken up for compliance.

The Standing War Indent Scheme provided for the automatic repetition of supply every six months of the expendable stores contained in the indent, non-expendable stores being supplied only as and when again demanded.

The stores demanded on the standing war indent represented only the arrangements for replenishing the equipment of those field medical units which began to function on mobilisation and did not include normal garrison military and civil requirements which were replenished as usual according to peace-time system of " Home Indent Schemes " twice a year in January and July.

Standing war indents for stores, both expendable and non-expendable, were completely revised and the revised indents for United Kingdom stores in substitution of the previous ones were despatched to London on 7 July 1940 and were taken up for compliance there in Septemper 1940. These revised standing war indents took into consideration the requirements of the additional medical units contained in the 1938 Plan of Operations (Pink Plan) to be repeated every six months for expendable stores. In addition, supplementary standing war indents prepared by DMS were despatched to London in March 1940. Standing War Indent Scheme was abolished later in 1941 when the DMS took up provisioning for the army after the supply of the third instalment of the six-monthly indents had been completed, as this limited scheme could not cope with the increasing medical requirements due to the constant expansion of the Indian army, when reserves had to be built up rapidly according to a forward programme of expansion.

Soon after the outbreak of the war the Medical Store Depots had to concentrate all their efforts on (1) the procurement of huge quantities of medical stores both indigenous and imported for military units in India and overseas (2) finding additional accommodation to stock them and (3) the problem of manufacturing additional stores. These problems were met to a certain extent in the beginning by building additional accommodation in each depot for storage and by expanding the factories at Bombay and Madras. Later considerable accommodation was hired near the premises of the depot. New factories were also established.

ANTI-GAS STORES

Special provision existed for the reserve of anti-gas equipment of army requirements for the first five months. The replenishment of these stores was made on the Standing War Indent Scheme. Manufacture of anti-gas ointment and stocking bleaching powder in bulk rested with the Army Ordnance Branch. The anti-gas ointment could only be manufactured on mobilisation as its potency was for a brief period.

Vaccines and Sera

Vaccines and sera for the army during peace and war were stocked at the Central Research Institute, Kasauli (Plague vaccine at the Haffkine Institute, Bombay). To meet all likely fluctuations in peace time it had been found by experience at the Central Research Institute that it was advisable to maintain peace-time stocks equivalent to about four months' average issue plus the mobilisation reserve.

Changes affecting Stocks at the Central Research Institute

The Director, Central Research Institute, Kasauli, had been asked to arrange for the supply of sera for four special expeditionary forces overseas, but had been instructed that the sera necessary for the purpose were not to be struck off charge for ordinary issue or replaced in store. In practice, this meant that if the sera were to be available there would be a reduction in the quality available for ordinary peace-time issues. The supplies for these forces represented a considerable total.

The scales of issue to Medical Units had been increased in the case of several sera. Stocks were being adjusted to meet these increases. Part of the increase was being met by adjustments between sera in the Stock Lag supply and adjustments in other sera at the Central Research Institute, Kasauli.

Taking into view the position of stocks prior to the commencement of World War II, if the quantities required for the special forces were taken into account along with the changes due to increases in scales it was obvious that these items were deficient. This position was rectified when the five months' (Stock Lag) reserve was received.

In an emergency it was proposed that the temporary deficiencies would be made up by local purchases in India, the stocks in possession of firms in India being ascertained.

The following were the sources of supply of sera at the commencement of World War II:—

Anti-tetanic serum 8,000 units	Bayer
,, ,, 1,500 ,,	–do–
,, ,, 500 ,,	–do–
Anti-dysentery serum	–do–
Anti-streptococcus serum	–do–
Anti-anthrax serum	–do–
Anti-gangrene serum	–do–
Anti-diphtheritic serum	Evens
Anti-meningococcus serum	Lister

It would be seen that all but two items were of German origin.

The instructions at the commencement of World War II were that the issue of sera to all Medical Units should be carried out by the Central Research Institute, Kasauli, automatically on the designated mobilisation days. It was advisable, however, only to issue the sera when units moved or were likely to move at short notice. The Central Research Institute had no responsibility for the purchase of sera. Sera were merely received, held and issued on behalf of the army. Issues were free on demand.

Mobilisation supplies at the CRI Kasauli, were held for the following sera:—

Anti-tetanic serum	8,000 units
„ „	1,500 „
„ „	500 „
Anti-diphtheritic serum	10,000 units
Anti-meningococcus serum	
Anti-streptococcus serum	
Anti-anthrax serum	
Anti-gasgangrene serum	
Anti-dysenteric serum	

X-ray Stores

The responsibility of maintaining in peace adequate reserves of X-ray stores was vested with the DMS. Arrangements were made by him for the housing and care of the war reserves of these stores with importing firms such as Messrs. Kodak Ltd. War requirements, however, were included in the standing war indents of the Medical Store Depots.

THE PROBLEM OF MEDICAL SUPPLIES DURING THE WAR, PRINCIPAL SUPPLY OFFICERS' COMMITTEE (INDIA) AND THE WAR SUPPLY BOARD

The main problem of supplies during the war arose from India's dependence on outside sources for a great majority of articles. Some of the imported items were unsuitable for long storage. Only limited stocks of such articles, therefore, could be kept in the country. Trade in India carried stocks of some of the imported articles in sufficient quantity. Other imported articles were either not available with the trade or available in meagre quantity and were not always of the requisite quality. Such imported stores were, therefore, obtained by the Medical Stores Department on " Home Indent Schemes " through the agency of India Store Department, London, twice a year in July and in January and on supplementary indents as often as required.

India being dependent for the major portion of its supplies on outside sources difficulties were anticipated in the event of interference with communications. The British Government, therefore, with very large manufacturing resources at its disposal had considered it necessary to hold three months' complete stocks of medical stores for all defence services including Indian. Australia was manufacturing several important medical stores not made in India. In the event of communications with the United Kingdom being cut off the possibility of obtaining various items from Australia in emergency was investigated prior to the commencement of the war. Some items like sera, were available from South Africa.

Many imported articles, however, were being gradually replaced by those manufactured in the country. There was considerable improvement in this direction as the war progressed. A large number of articles including most tinctures and extracts, were manufactured in India either by the Medical Store Depot factories or by other firms. Another problem was that very few complex articles could be produced in India without importing in finished form some essential components. There was also the question of sufficiency of technical experts. In addition, problem of supplies during the war was complicated by the fact that not only the needs of the army but the requirements of the civil population had also to be considered.

These problems of supplies for both the civil and the military in war time were considered by a Committee called Principal Supply Officers' Committee (India) which prepared in peace time a correct and comprehensive plan for the part that India was to play, *vis-a-vis* the United Kingdom and the Commonwealth in the matter of war supplies.

This Committee also dealt with information regarding various other problems of supplies during the war, e.g., ensuring priority of of civil on indigenous and imported stores, collating the requirements control departments and vital industries with those of the army.

The Medical Stores Sub-Committee of the Principal Supply Officers' Committee consisted of the following officers:—

(1) Assistant Director General, Indian Medical Service (Stores)
(2) Director of Medical Organisation in War
(3) Principal Medical Officer, Royal Air Force
(4) Director of Veterinary Services, Army Headquarters
(5) Director, Industrial, Intelligence and Research Bureau
(6) Civilian Technical Officer, P.S.O.C. (I)

Other members were co-opted as required. From August 1939, the Director General, Indian Medical Service took the chairmanship of this sub-committee which was mainly concerned with the following problems:—

(i) Framing estimates of war consumption of all imported stores.

(ii) Preparing lists of articles on which—
    (a) control on export and re-export must be exercised during war.
    (b) stocks, sales and manufacture would be controlled partially or wholly during the war.

(iii) To investigate the resources of certain Eastern Group countries, especially Australia, South Africa, Malaya, etc., regarding the supply of certain drugs and sera.

(iv) Collecting information about sources of supply of stores which were difficult to obtain during war time, e.g., surgical and rubber goods, invalid foods, sera, nitrous oxide, glass containers, etc.

A list of requirements of medical stores was submitted to the Supply Board in Great Britain, prior to the commencement of the war to assist production in the United Kindom.

The Principal Supply Officers' Committee kept in close touch with the Principal Supply Officers' Organisation of the Committee of

Imperial Defence and the corresponding organisation in the dominions so as to ensure that India in times of war, on the one hand, received her adequate portion of Commonwealth and foreign resources, and on the other hand she made available her surplus material and manufactured goods for the needs of the Commonwealth.

War Supply Board

The Principal Supply Officers' Committee on the outbreak of the war became the nucleus secretariat of the War Supply Board.

The function of the War Supply Board in general was to take such steps as would be necessary to ensure that supplies of all kinds required for the prosecution of war were available with the utmost speed and to co-ordinate the activities of all departments of the Government of India and commercial organisations concerned.

As the nature of medical supplies was peculiar, it was intended that the War Supply Board on the advent of war should not interfere with the system of procurement of imported stores by the DGIMS from the Director General, India Store Department, London, on ' Home Indent Schemes '. This system of procurement was continued during the first three years when changes were made in this procedure.

THE CONTACTS OF THE DGIMS WITH OTHER DEPARTMENTS IN RELATION TO THE ADMINISTRATION OF THE MEDICAL STORES DEPARTMENT

The DGIMS as head of the Medical Stores Department, had in peace time worked in closest co-operation with the Director General, India Store Department, London, who had on his staff for the purpose of medical stores two advisers, both retired IMS Officers, who dealt respectively with (a) drugs and chemicals and (b) instruments, appliances and sundries. The quality of the equipment received from the India Store Department was consistently high, but the increasing delay in delivery since the war began led to the formation of a committee in London under the medical adviser to the Secretary of State for India in order to accelerate supply and delivery. This committee included the two advisers for stores.

The DGIMS as Chairman of the Scientific Advisory Board of the Indian Research Fund Association and as the technical head of the large medical research institutions in India, including the School of Tropical Medicine, Calcutta, the All-India Institute of Hygiene and Public Health, Calcutta, the Central Research Institute, Kasauli, the Nutritional Laboratories of the IRFA, Coonoor, etc., was in day-to-day touch with medical research as it affected the development and provision of medical supplies of all kinds. He also controlled the Biochemical Standardisation Laboratory and was later Chairman of the Drugs Technical Advisory Board formed under the Drugs Act passed in 1940. He was also Chairman of the Indian Committee of the British Pharmacopoeia Commissions, the ADG (Stores) being its Secretary.

A further series of valuable contacts were with (i) the Imperial Council of Agricultural Research which was carrying out important developmental work in connection with the drug supply on both the animal and plant side, (ii) the Inspector General of Forests who was collaborating in the solution of a number of problems connected with the utilisation of forest medicinal products, (iii) the Indian Institute of Science, Bangalore.

Since the formation of the Supply Department the DGIMS had come into close relationship with this department and with the establishment of controllers of supplies in provincial centres, medical store keepers were instructed to keep in close touch with them and to work in co-operation with these officers in regard to the procuring of supplies, the fixing of prices and the development of new sources.

The stores office of the DGIMS was also closely connected with manufacturers and importers in India. To facilitate contact with them a number of associations were formed.

Steps were taken soon after the war had commenced to survey the manufacturing capacity in India in regard to medical stores and to keep a watch upon stocks of essential drugs in the country by means of a system of confidential notification of stocks held by the important dealers. Through all these links the work of supply of medical stores was greatly helped in the first vital period of the war.

STORES ORGANISATION AT THE COMMENCEMENT OF THE WORLD WAR II EXPANSION AND REORGANISATION TO MEET THE WAR CONDITIONS

On the outbreak of hostilities the DGIMS realising the vast nature of the work of supplying medical stores pressed for sufficient funds to raise the working stocks of imported medical stores from six months to one year and of indigenous medical stores from three months to six months. The financial sanction for this was given only in February 1940, and supplementary indents for improvement of stock position were sent to London in February and March 1940 consisting of 1,799 items. Appreciating a possible delay in the shipping of stores from abroad he started preparing for self-sufficiency of India in regard to the supply of medical stores. An analysis of articles stocked in the Medical Store Depots at the commencement of the war showed the following:—

Imported	2,391
Indigenous	846
Composite (containing imported ingredients)	232
Total	3,469

Stores required by the Medical Store Depots were obtained until the purchase of medical stores was transferred to the Supply Department by the following channels:—

(a) *By importation* from London

(b) *From other Government Departments* such as Indian Army Service Corps, Military Engineering Services, Director of Botanical Survey and the Central Board of Revenue

(c) *By local purchase* from business firms and contractors in India

(d) *By manufacture* at Medical Store Depot Factories

Imported Stores Supplies

Prior to World War II, the scheme adopted for providing medical stores to military and civil customers was a simple one. The bulk of the requirements of imported stores was included in the six monthly indents known as ' Home Indents ' sent to the India Store Department, London, for compliance every January and July. Urgent and unforeseen demands were sent in the form of supplementary indents. The usual time lag in receiving the supplies was six to nine months in the case of regular six monthly indents and three to six months in the case of supplementary indents.

Central system of provisioning had to be reorganised to suit the exigencies of the war. The foremost problem was the question of obtaining the maximum number of articles within the minimum period possible. With this end in view an elaborate system of watching the progress of deliveries of articles was maintained at both the provision and supply ends of the chain.

As already pointed out above, shortly after the declaration of the war the working stocks of imported medical stores were stepped up from six months to one year and that of the indigenous items from three months to six months.

With a view to avoid unnecessary strain on the resources of the United Kingdom the number of items on the indents sent to England was kept down to the absolute minimum. Out of a total number of 534 items in the Drugs Section alone, nearly 300 were placed on the indigenous list. Almost all bottles, dressings except of special types, bandages and rubber tubing were obtained locally in India. As for surgical instruments and appliances only complicated and delicate equipment was obtained from England. Appliances, such as Apparatus Oxygen Haldane's, Pneumothorax, Blood Transfusion sets, Primus stoves, etc., were manufactured in India.

Two Home Indents were submitted every year:—

(a) In July for eight months' requirements

(b) In January for four months' requirements

The requirements in each indent were estimated clearly one year in advance of the commencement of the supply and six months' reserve was kept in addition to any specially anticipated requirements.

Perishable articles like rubber goods and articles likely to deteriorate rapidly were supplied in monthly or quarterly instalments.

Scheme of peace-time Home Indents was continued as during the first two years of the war.

LOCAL SUPPLIES

These were contracted for, annually by each depot separately in the month of January.

Each depot in November every year provided other depots with lists of articles which were considered as likely to be obtained more favourably through their agency and the depots concerned incorporated these articles in their schedules of stores for which tenders were invited.

Informal Contracts: In addition to the system of obtaining local stores by annual contracts, stores urgently required when stocks were running low were also obtained under informal contracts.

Inspection of Stores: The Medical Stores Department in addition to doing its own provision and procurement also carried out during the first two years of the war, its own inspection of medical stores, manufactured locally or obtained from indigenous sources. A separate inspection department was established later under the Controller General of Inspection, MGO Branch, which included medical stores.

Accounting: All accounting of stores including factory accounts, their profit and loss statements was controlled by the Military Accountant General. This system of accounting was continued during World War II.

Priced Vocabulary of Medical Stores and Medical Mobilisation Equipment Scales of Field Medical Units: Both these had been undergoing continuous changes at the Army Headquarters since the commencement of the war which made the task of the Medical Stores Department extremely difficult, as it was not until two years after the commencement of the war that the revision of the PVMS and the Scales was finally completed.

Staff Officers: The cadre of officers of the Medical Stores Department during peace time was as follows:—

IMS Officers 6 (including one ADG and one leave reserve)
Assistant Surgeons IMD 6
Sub-Assistant Surgeons IMD 5

All these were considered as in military employ, but worked directly under orders of the DGIMS. Vacancies were filled by selection from officers in military employ.

There were two highly qualified and experienced chemists, in charge of factories at Madras and Bombay. They were designated as factory managers. The factory manager of the Madras Depot was also the advisory chemist to the department and had a chemical research laboratory.

The factory managers were assisted in their work by the following staff:—

	Madras	Bombay
Assistant Factory Manager (Assistant Surgeon, Indian Medical Department)[3]	1	1
Assistant Chemists	2	1
Compounders	6	4
Laboratory Assistants	1	..

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[3] These two Assistant Surgeons were included in the cadre of six Assistant Surgeons mentioned above.

Finance: The Medical Stores Department during peace time was financed from the Defence Estimates. The DGIMS was responsible to the Government of India for the control of expenditure. Cost accounting transactions were made by the Military Accounts Department.

Pricing

The prices at which stores were taken on charge by the Medical Store Depots were as follows:—

Imported Stores

(a) Invoiced price converted at 1 s. 6 d. to the Rupee *plus*
(b) 1/6th of (a) above on account of freight, packing and landing etc., *plus*
(c) Customs duty as per the current customs tariff on (a) *plus* (b) above

Final PV Rate of Imported Stores was total cost of (a) *plus* (b) *plus* (c) above, *plus* 20 per cent. on account of departmental charges.

Local Stores

(a) Actual purchase rate *plus*
(b) Delivery and packing charges if any levied by the supplier or incurred by the depots
(c) *Plus* 20 per cent. on (a) and (b)

Manufactured Items

(a) At cost of raw materials *plus*
(b) Cost of production

Later during the war military financial authorities decided to have central pricing done for all depots at headquarters for both imported and local stores in substitution of each depot having its own PVMS rates. This change was necessitated owing to the difficulties felt by the Militay Finance Department in raising appropriate debits against His Majesty's Government for stores supplied to the United Kingdom.

Expansion and Reorganisation to meet War Conditions

At the outbreak of the war the Store Depots had a combined storage capacity of 250,000 sq. ft. floor space. In July 1940, Officers-in-Charge of all depots were warned to take immediate steps to increase the then existing accommodation by at least 50 per cent. Whenever possible additional accommodation was secured by appropriation of the existing buildings rather than by building entirely new structures. When this was found inadequate new structures were erected in consultation with the local military engineering authorities. In addition to such expansion of the parent depots various sub-depots were added to each main depot as under:—

Main Depots	*Sub-depots*
Calcutta	1. Burdwan 2. Patna 3. Jalapahar (Darjeeling Hills)

Bombay	1. Mahim 2. Amrut Buildings at Ballard Estate, Fort, Bombay 3. Gandevi 4. Alexandra Docks
Madras	1. George Town 2. Jaffer Serang
Lahore	1. Sabathu (Simla Hills) 2. Whiteway Laidlaw Buildings 3. Various Regimental Lines in Lahore

The depot staff was, of course, increased along with the increased accommodation.

Later two entirely new depots had to be instituted, one at Karachi and the other at Raipur. With increasing importance of ARP measures, a depot was opened at Karnal known as the ARP Central Reserve Depot with a total floor space of 33,000 sq. ft. in June 1942.

COLD STORAGE ACCOMMODATION FOR PERISHABLE ARTICLES

Large stocks of rubber articles together with drugs, such as insulin, chloroform and aether had to be kept in cold storage. Before the war owing to the comparatively small bulk of perishable articles stocked, only Madras Depot was equipped with refrigerating plant with 6,000 cubic ft. of storage space. Other depots had relied on ice chests for storage of small quantities of perishable articles on their charge. In November 1940, it was decided to provide modern refrigerating plants at Bombay, Calcutta and Lahore Depots and to increase the cold storage space. On completion of this scheme at a cost of Rs. 40,000, the cold storage accommodation at all the depots had been increased approximately to 21,000 cubic ft. In addition, in April 1942, a portion of the cold storage accommodation of the Imperial Council of Agricultural Research at Kirkee was taken over and used for storage of aether and biological products from the Haffkine Institute, Bombay. This additional accommodation was later transferred to the DMS who utilised it for the storage of blood plasma, sera and vaccines for the army.

The steps outlined above did not provide sufficient space for storage of goods, which, although able to withstand storage for reasonable periods of time in moderate heat, would have their period of useful life prolonged by storage in cool conditions. In view of the scarcity of supply of refrigerating plants and air-conditioning plants, during the war, it was decided that articles of this nature would very well be stored at hill stations in India. Following this policy in February 1940 two barracks with total storage capacity of about 1,04,240 cubic ft. situated at Jalapahar (Darjeeling Hills) were taken over.

In October 1942, certain military barracks at Sabathu (Simla Hills) providing storage area of 9,397 sq. ft. were taken over for storing all rubber articles from Lahore and Karnal Depots. In addition most of the perishable articles from CPO stocks (for supply to overseas theatres of war) held at Raipur were transferred here. All these measures proved adequate for cold storage of all articles requiring these precautions.

WAR TIME EXPANSION OF MEDICAL STORE DEPOTS AND FACTORIES

The two factories at Bombay and Madras manufactured a large volume of drugs, dressings and other preparations numbering about 350 in all. The first field dressings were made at Madras, while the manufacture of all kinds of bandages was concentrated at Bombay. Other items such as pills, tablets, tinctures, extracts, etc., were manufactured at both the factories. The Madras factory was equipped with a research laboratory where all technical problems connected with the supply of drugs for the department were investigated.

War led to immediate increase in the work of these factories, in three main ways. Firstly, there was greater demand for articles which were already turned out by the factories before the war. Secondly, owing to the restriction on imports it became necessary to manufacture locally the articles which, prior to the war, were imported. Thirdly, it became necessary to devise substitutes for certain preparations, the raw materials for which were in short supply. Research for this purpose was undertaken at the Madras factory. This latter problem became of increasing importance as the work progressed and in May 1940, the Advisory Chemist at Madras was transferred to Headquarters as the Chief Advisory Chemist to the Medical Stores Department, his place being filled by the Factory Manager at Bombay.

Increased production necessitated additional machinery and staff both at Bombay and Madras and these were installed and new buildings constructed. In order to utilise the facilities to the full, the system of working in double shifts was introduced. New factories were established at Roypuram (Madras) and at Chheharta (Amritsar).

DEVELOPMENT OF INDIGENOUS PRODUCTION OF MEDICAL AND SURGICAL EQUIPMENT

The problem of securing adequate supplies of medical and surgical equipment was a very complex one. Before the war India had been accustomed to rely to a great extent on imported articles. One of the first facts which became evident after the outbreak of war was that the sources of supply were very seriously interfered with. Firstly, because the exporting countries, particularly Great Britain, required for their own use many articles previously exported, and secondly because there were difficulties of shipping space. It, therefore, became an urgent necessity for India to conserve her medical supplies in every possible way and to utilise all available sources. In October 1939, a Departmental Committee under the DGIMS was formed to investigate the sources of the supply of drugs, chemicals and biological products, the use of suitable substitutes and other means of economy. The place of this Committee was taken in May 1940, by a larger and more representative Committee—the Drugs Supply Committee. A more detailed reference to the expansion of indigenous production of drugs and the development of the production of surgical instruments and appliances during the war will be made in a later section.

REORGANISATION OF THE VARIOUS BRANCHES OF THE STORES SECTION OF THE OFFICE OF THE DGIMS

As the work progressed, the enormous increase all round in stores activities resulted in a condition of affairs with which the normal peacetime organisation was unable to cope. It became obvious that this could only be overcome by central planning and concurrent central purchase. The Stores Section of the office of the DGIMS, therefore, rapidly expanded during the war.[4] There was corresponding rapid increase in officers and personnel of depot establishments.

The Stores Section at HQ was reorganised and reconstituted into the following branches:—

(1) *Indent Branch*

This dealt with the preparation of indents on the United Kingdom for imported stores, indents on the Indian Store Department and other departments in India. It also dealt with the various new demands made by the DMS including field medical equipment and orders for supplies overseas.

(2) *General Branch*

This dealt with all problems of administration including accounting and budgeting.

(3) *Statistical Branch*

This dealt with statistics regarding stock and supply positions, watching deliveries, imports and exports and disposal of surplus and obsolete stores.

(4) *Planning Branch*

This dealt with the development of manufacture of items in India previously imported, the questions of production by the trade and the various requirements of the Medical Stores Department.

(5) *Export/Import Branch*

This branch was constituted in November 1941, and was responsible for the estimates of the requirements of the civil population and their import under Lease/Lend procedure and problems in general connected with export and import of drugs.

In March 1941, a fundamental change in the administration was made which had very far reaching effects. The control of the Medical Store Depots was transferred from the Defence Department to the Supply Department.

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[4] See Appendix II showing the increase of Staff at Headquarters of Stores Section on successive dates.

ACTIVITIES OF THE MEDICAL STORES DEPARTMENT DURING THE INITIAL STAGES OF WAR (1939-40)

Before the actual outbreak of the war various expeditionary forces bearing code names ' Emu ', ' Heron ', ' Hawk ', ' Wren ', etc., were sent overseas. The Medical Store Depots particularly at Bombay, Calcutta and Madras were kept busy in supplying initial medical equipment and building up reserves for these forces. Later supply of stores for forces named as ' Herring ', ' Trout ' had to be undertaken.

Reserves for four months both for indigenous and imported items were to be located in India and for five months shipped overseas. Compliance of regular monthly indents for overseas forces had also to be made regularly.

The Medical Store Depots also prepared sets of special Sick Bay Medical Equipment for the Embarkation Commandants at Bombay, Calcutta, Madras and Karachi for use on transport ships. Moreover, all the depots got busy in constructing and fitting up, to the latest mobilisation equipment scales, new panniers, new field boxes, for field medical units in replacement of those proceeding overseas as issued by the Army Medical Mobilisation Stores.

Apart from the special requirements of war, and the normal civil and military requirements in India itself, the Medical Store Depots had to shoulder responsibility for supplies to Saudi Arabian Government dispensaries at Jedda and Bahrein. Stores manufactured in Medical Store Depot factories were also despatched to Burma as these were regular customers of the Medical Stores Department during peace time.

The following facts regarding supplies from the United Kingdom to India in the preliminary stages of war were brought to the notice of the DGIMS by the India Store Department, London, particularly with reference to the emergent indents:—

(i) The prices in the United Kingdom had risen very much since the war had started—up to 33 per cent. or even more in some items.

(ii) Shortages and delays were expected in the supply of some of the articles, chief of these being crude drugs and essential oils exported from abroad. On the whole, it was estimated that it would take at least six months to procure the articles contained in the indent.

(iii) Ergot was very scarce and very expensive and delays were expected in the case of tannic acid, ichthammol, paraffin liquid, potassium permanganate and many other drugs such as neoarsphenamine, sulpharsphenamine, atebrin, plasomoquin, potassium citrate, potasssium iodide and bromides.

(iv) Olive oil and cod-liver oil were rather short and the possibility of accepting halibut-liver oil in place of cod-liver oil was suggested.

(v) The time lag in receipt of stores in India would be a minimum of eight months.

Actually supply of special emergency indents was not fully received in India till the middle of 1942 and then too, a number of articles on these indents were by that time omitted, being unavailable while substitutes were supplied in many cases.

Military Finance Department later decided that the working stock of medical stores should be catered for on the same lines as for all other military stores, viz., Ordnance, Engineering, i.e., six months for the United Kingdom stores and three months for indigenous stores. It may be stated that the methods of provisioning for the ordnance and other stores were quite different from those adopted for medical stores and allowed extra margin of stocks on account of time lag, etc., while the provisioning system for medical stores then, was based purely on the average of previous three years' expenditure. Apparently, the Military Finance Department did not take into consideration this important point when reducing the authorised store margin of medical stores.

On 3 November 1939, the DGIMS called a meeting at Delhi of important manufacturers and distributors of drugs and surgical instruments in India, with a view to establishing contacts and to study difficulties in the supply and distribution of drugs in India.

DEPARTMENT COMMITTEE (1940) UNDER THE DGIMS

During February and March 1940, a departmental committee was constituted under the Chairmanship of the DGIMS. The terms of reference of this Committee were as follows:—

(1) To see to what extent the imported list could be reduced and the local list increased.

(2) To examine and compare the lists of essential drugs prepared in the United Kingdom by the Medical Research Council and in India by Colonel Sir Ram Nath Chopra, Director, Biochemical Standardisation Laboratory, Calcutta.

(3) To examine the question of substitutes when any article was not forthcoming.

(4) To produce the list of composite drugs obtained locally (i.e., drugs requiring imported articles or raw materials for their manufacture).

(5) To consider any other questions connected with economy in the use of drugs in hospitals.[5]

Drugs Supply Committee

This Committee was formed by the DGIMS in May 1940. The duties of this Committee, were to advise him in the matter of drug supplies and drug substitutes and economy of drugs during war time as also the solution of war-time problems concerning the supply of medical stores.

The Committee (later known as Medical Stores Supply Committee) held ten sittings and comprised of:

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[5] The report of this Committee is contained in Appendix III.

DGIMS (Chairman)
Financial Adviser (Military Finance)
DMS
Assistant Director General (Stores)
Director, Biochemical Standardisation Laboratory
Chief Chemist, Central Revenues, and later on, the Director of Production of Drugs and Surgical Instruments and representatives of the Commerce and Supply Departments of the Government of India
Chief Advisory Chemist (Secretary)

Medical Stores Committee

An India Office Medical Stores Committee with the Medical Adviser to the Secretary of State of India as its Chairman was constituted in July 1940 in the U.K. to work in collaboration with India Store Department, London.

The functions of the Committee were as follows:–

(1) To review and amend where necessary all medical indents received from India.

(2) To conduct regular examinations of the progress achieved in fulfilling India's demands and to suggest means of expediting where necessary.

(3) To take action on Government of India's communications concerning supply of medical stores from the United Kingdom.

Copies of the proceedings of the Committee were furnished to the DGIMS, the Director General, India Store Department, and to the Supply Section of the India Office.

Personal weekly air-mail correspondence between the DGIMS and the Medical Adviser to the Secretary of State for India was established, soon after the formation of the Committee. This personal correspondence continued without intermission for the first four years of the war and established perfect understanding and liaison between the United Kingdom and India in matters of supplies of medical stores.

The Committee also took an important decision as a war measure that the shipping of stores to different parts in India to suit the location of Medical Store Depots should be abolished and all stores should be shipped in bulk by earliest ship to any suitable port in India. This procedure caused a certain amount of inconvenience at the Medical Store Depots, and involved frequent rail transport for the stores to reach the particular Medical Store Depot.

PROGRESS OF SUPPLY OF WAR INDENTS

Stock Lag War Reserve Indent

On 1 December 1939, intimation was received from the India Office that 2/3rds of this indent had already been despatched, although there was delay in transit and the position in June 1940 was that out of a list of 580 items demanded a total of 376 items had been received. It was not till the end of 1940 that the remaining items were received.

Standing War Indents

The first standing war indent (both of expendable and non-expendable items) was taken up for compliance on 8 September 1939. The position in June 1940 was that out of a list of 997 items on the standing war indent, a total of 460 items had been received and the rest except 247 items were under shipment. It was not till the end of 1940, that the first standing war indent (both expendable and non-expendable portions) was fully received.

The second standing war indent (expendable portion only) was taken up for compliance by London in June 1940 and the third standing war indent (expendable portion only) in January 1941. Both these indents, excepting a few articles were fully received by the end of 1941. In August 1941, however, the Standing War Indent Scheme of the Medical Stores Department was abolished as in view of the rapid expansion of the Indian army the Standing War Indent Scheme was not considered feasible.

Special War Indents

The following special war indents were sent to Director General, India Store Department, London, for supply.

(a) Eleven indents were sent for imported articles (expendable) in connection with the 1940 expansion of the army in India in August 1940; (b) The indents for surgical instruments and appliances for 1940 expansion did not receive financial sanction for sometime and had to be included later in the large consolidated indent for initial equipment for the requirements of 1941-42 expansion which was preferred in February 1941; (c) War indent for non-expendable stores shown in list 'U-B' for maintenance and reserve for the expansion of the Army in August 1940; (d) Indents for special articles required for General Hospitals according to the revised medical mobilisation equipment scales, and for special ophthalmological, ear, nose, throat and dental equipment in August 1940.

Actually 30 consolidated indents for imported stores were sent to the Secretary of State for India, London, for compliance during 1940. Supplies on the above war indents did not materialise fully till about the close of 1941.

THE 'U' LIST

Early in April 1940, DMS drew up an itemised list of expendable stores calculated to be sufficient to maintain one division for one month. This list was at first called 'D' list A. Another 'D' list B was also drawn up showing lists of instruments and other non-expendable articles sufficient for one divisional group for six months. These lists of requirements of a division for one month and six months respectively were later known as 'U' ('U-A' and 'U-B') lists and were passed on to the DGIMS as yardsticks for compilation of reserves and maintenance of medical stores for the army. They had to be further divided by the DGIMS as indigenous and imported 'U' lists (A and B). These

'U' lists (A and B) were very useful in placing orders, especially for the United Kingdom stores by cables and assumed paramount importance as the war progressed.

In order to ascertain the progress from month to month of the collection of stocks of 'U' list items, stock returns of these items on the first of every month were called for by the DGIMS from each Medical Store Depot during 1941-42.

In the latter part of 1942 the 'U' (i.e., 'U-A' and 'U-B') lists were amalgamated and revised, the resulting list being renamed 'Reserve List'. This latter term was used for the supply not only of reserves but also maintenance for one division for one month.

As regards the building up of stocks in terms of 'U' list the following difficulties were met with:—

(1) The lists were not accepted as such by the Middle East who were working on their own 'U' lists.

(2) As the 'U' lists did not contain all the articles included in the revised Medical Mobilisation Equipment Scales, it was anticipated that the large orders placed by the DGIMS on the Secretary of State in 1941 for 133 'U' imported and 23 'U-B' imported lists according to the forward programme would not fully cover the maintenance of the various new field medical units.

In the first two years Medical Store Depots supplied the DMS completely made-up equipment as units—but from September 1941, supply from depots was in terms of either itemised lists of the actual equipment required or in terms of so many 'Reserved Lists' referred to above.

A statement of the special war demands placed by the DMS on the DGIMS, during 1939 and 1940 is given below:—

WAR DEMANDS 1939–40*

Sl. No.	Type of stores	Date on which DGIMS was asked to arrange provision or replacement
1.	Technical books for General Hospitals ..	24–7–1939
2.	3 months' reserves of anti-gas stores ..	6–10–1939
3.	3 months' reserves of medical stores ..	6–10–1939
4.	2 sets Clinical Laboratory equipment ..	17–10–1939
5.	9 sets Clinical Laboratory equipment ..	22–11–1939
6.	3 sets Clinical Laboratory equipment ..	2–12–1939

Sl. No.	Type of stores	Date on which DGIMS was asked to arrange provision or replacement
7.	1 set Clinical Laboratory equipment ..	9-12-1939
8.	10 sets Sick Bay equipment	5- 1-1940
9.	1 set Clinical Laboratory equipment ..	17- 1-1940
10.	Anti-gas equipment— 21 Field Ambulance sets 126 Regimental sets .. .. .. 21 Casualty Clearing Station sets .. 84 General Hospital Section sets	9- 2-1940
11.	2 ' T ' Class Hospital ships	9- 5-1940
12.	One Field Dental Outfit One Dental Anaesthetic Outfit	1- 3-1940
13.	Anti-gas equipment— 1 Field Ambulance set 6 Regimental sets 1 Casualty Clearing Station set 4 General Hospital Section sets	7- 3-1940
14.	Anti-gas equipment— 8 Field Ambulance sets 21 Regimental sets 4 Casualty Clearing Station sets 8 Staging Section sets 29 General Hospital Section sets	9- 3-1940
15.	One Field Ambulance One Casualty Clearing Station One Indian Convalescent Depot One Indian General Hospital (Headqrs. + 4 Sections)	14- 3-1940
16.	Four Field Ambulances One Field Hygiene Section	11- 4-1940
17.	Provision of equipment for 3,000 I.T. beds to meet requirements under the Pink Plan ..	1- 5-1940
18.	Reserves—Anti-gas-11 × List ' U ' ..	1- 6-1940
19.	Two Field Hygiene Sections Four Motor Ambulance Sections One Depot Medical Stores	

Sl. No.	Type of stores	Date on which DGIMS was asked to arrange provision or replacement
	One Field Laboratory One British Convalescent Depot Two Indian Convalescent Depots One Casualty Clearing Station Two British Staging Sections Four Indian Staging Sections Three Combined General Hospitals—of 5 Sections each. One Indian General Hospital of 10 Sections	9- 5-1940
20.	One Field Laboratory	9- 5-1940
	Medical Stores to complete old units to revised scale—	
21.	(i) Additional items for 28 Sections, General Hospital	27- 5-1940
22.	(ii) Additional items for a Casualty Clearing Station	27- 5-1940
23.	(iii) Additional items for 3 Convalescent Depots (1 British, 2 Indian)	30- 5-1940
24.	Reserves of Medical Stores—11 ×List ' U ' ..	1- 5-1940
25.	37 sets Sick Bay equipment	1- 6-1940
26.	Special operating equipment for General Hospitals— Four sets Surgical (List ' A '). .. .. Two sets Eye, E.N.T., Dental (List ' B '). One set special operating equipment for a Casualty Clearing Station (List ' C ').	5- 6-1940
27.	Five sets of List ' A ' above Two sets of List ' B ' above	15- 6-1940
28.	One ' T ' Class Hospital Ship	20- 6-1940
29.	Provision of equipment for 3,800 British and 4,900 Indian Troops beds	27- 7-1940
30.	One Field Ambulance (Replacement of No. 21)	27- 7-1940
31.	Two Field Ambulances One Field Hygiene Section One Combined General Hospital of 5 Sections	1-8-19—40

Sl. No.	Type of stores	Date on which DGIMS was asked to arrange provision or replacement
	1940 Expansion	
32.	12 Field Ambulances 8 Field Hygiene Sections 1 Sub-Section Field Hygiene Section 4 Casualty Clearing Stations 1 British Staging Section 4 Indian Staging Sections 2 Depot Medical Stores 1 British Convalescent Depot 1 Indian Convalescent Depot 10 X-Ray Units 4 Anti-Malarial Units General Hospital 13 Headquarters 14 British Sections 95 Indian Sections 2 Cavalry Field Ambulances to be converted to Armoured Brigade Field Ambulances	6- 8-1940
33.	8 British Staging Sections 6 Indian Staging Sections 2 Field Hygiene Sections 2 British Convalescent Depots 2 Indian Convalescent Depots Indian General Hospital—2 Headquarters 32 Sections 11 Regimental Sections	7- 8-1940
34.	One Field Hygiene Section (Replacement for No. 13 Field Hygiene Section)	12- 8-1940

In addition to the above demands, two hospital shops were equipped in 1940 one at Bombay and the other at Calcutta.

Field medical units for 1940 expansion were in the first instance supplied from the Medical Mobilisation Stores under the control of the DMS, replacements being made by fitting up fresh medical units in Medical Store Depots. Great difficulties were, however, experienced by the Medical Stores Department in completing the field medical units and other war demands for 1939-40 in scheduled time, as the time lag permitted for procurement was made very brief in most cases. In spite of this, however, extensive local purchases by the depots were resorted to and in this connection the financial powers of the DGIMS and the officers in charge of depots were increased accordingly.

Burma Demands

During the latter part of 1940 at the request of the DMS help was also rendered to Burma in supplying complete equipment of four field ambulances. This equipment was made according to the old Medical Mobilisation Equipment Scales and was accepted by Burma.

1940 Expansion and Special War Demands during 1939-40 including Additional Demands for Overseas Forces

At a conference on 30 April 1940, at which the AG in India, the DGIMS and the DMS were present, the question of supply for certain overseas forces was discussed. It was decided that arrangements should be made by the DGIMS from his existing stocks to supply 11 times out of the standard itemised list of medical stores ' U ', which was considered adequate for the maintenance of one division for one month. The indent for imported stores 11 × ' U ' was, therefore, immediately sent to the Director General, India Store Department, London, on 4 May 1940. The articles contained in this emergency indent were received fully during the course of the next 10 to 12 months.

On 1 July 1940, a special committee meeting was held in the office of the AG in India at which important decisions were taken regarding supplies of medical stores required for war including those connected with the 1940 Expansion Scheme.

The DGIMS explained that after providing two months' supplies for ' Trout ' (a force from India for overseas) he would have stocks sufficient for six months' supply for the army in India (Pink Plan). He also should have on the sea a war indent amounting to six months' supplies for the army in India (Pink Plan).

The DGIMS was asked to keep packed and ready for despatch two months' supplies for ' Trout ' and to start packing further three months' supplies to be ready within six weeks.

Drugs required for 1940 expansion (1,00,000) were to be demanded forthwith. The maximum required from overseas would be for five divisions, nine months in the first instance to be followed by a further demand as soon as the first demand had been accepted. It was decided that it would be sufficient to demand seven months' in the first instance for five divisions making a total of 35 ' Us '. In addition, for stocking new units to be formed for these troops, for hospital ships, ambulance trains and war hospitals in India a further 5 ' Us ' would be required. Demands for 40 ' Us ' should, therefore, be placed.

The DMS was asked to examine with the MGO the question of forming a Provision Branch.

The question of provision of drugs for the further expansion known as the ' Forward Programme ' was taken up. The DMS was instructed to prepare an estimate of his requirements and the DGIMS undertook to consider extensive buying from the Indian market, and arrange for the expansion of his manufacturing capacity and for the provision of substitutes for certain imported drugs.

Following the decisions made at the committee meeting financial sanction was received immediately for the following:—

(i) 40 'Us' imported and 9 'U-Bs' imported

(ii) 108 'Us' indigenous

Orders for 40 'Us' were immediately placed on the United Kingdom by telegram on 15 July 1940, and for 9 'U-Bs' imported by special standing war indent orders were despatched by air mail.

In July 1940, the Commander-in-Chief ordered the question of future supply of drugs for the army to be taken up, the main points for consideration being:—

"(a) Would it in any case be most desirable to set free IMS personnel then employed in the medical stores department and substitute experts from the trade?"

"(b) Whether the responsibility for the provision of medical stores should remain as then in the hands of the DGIMS or should it be transferred to the Supply Department?"

As regards (a) it was agreed by all concerned that it was not desirable to withdraw IMS officers during war time from the Medical Stores Department, especially as they had expert knowledge and experience of medical stores work and considerable dislocation was likely to be caused in the middle of the war by replacing them by experts from the trade who had no knowledge about the running of Medical Store Depots. It was decided, however, that further recruitment for officers may be made from either chemists or experts from the pharmaceutical trade.

As regards (b) the question was discussed at a committee meeting on 9 August 1940. The following officers were present at the meeting:—

AG in India
Secretary, Supply Department
Director General of Supply
DMS
DGIMS
Secretary, Education, Health and Lands Department
Secretary, Defence Department

The main conclusions reached by the committee were as follows:—

> The Supply Department had not taken over what were known as "outside purchasing organisations" which included the Medical Stores Department but were available to assist them whenever required. The system then constituted was regarded by both the Supply Department and the DGIMS as the best possible; in fact, they were unanimous in stating that there was no suitable alternative to it and that it was capable of bearing not only the then existing load but any future load provided, of course, that the staff of the organisation was expanded as required. It was not, however, anticipated that large expansions of staff in any event would be necessary as the policy of the DGIMS and of the Supply Department was to make use of the civil trade and to stimulate it to the required extent. The Director General's factories were educative—they showed

the civil trade how to do what was required and also acted as a restraining influence on prices. It was not proposed to expand them largely.

The Secretary, Supply Department, stated that, as regards indigenous drugs, no difficulty was anticipated in producing a very large quantity in India, provided that a forward programme was approved. In order to secure efficiency and to improve the capacity of the civil trade, there must be a smooth and even flow of orders over a long period of time. To get a new industry going or to increase an existing one, *ad hoc* indents at uncertain intervals were useless. Authority was necessary to work for adequate stocks. Once this was done, there would be no more *ad hoc* indenting but indents could be made on stock.

The same applied though even to a higher degree, to the production in India of medical instruments and equipment. The Supply Department had no doubt that, provided they had (a) a firm forward programme and (b) a sufficiently high ceiling, they could, within a reasonable time, create a very good medical instrument industry in India. There was no shortage of medical instruments for present demands, but there was shortage for expansion.

The Secretary, Supply Department, further stated that the only change that would have to be made in the mechanism of the then existing organisation was that all demands of the DGIMS when once the forward programme had been agreed to, would go direct to the War Supply Board and not through the Adjutant General and the Secretary, Defence Department.

The DGIMS, stated that as regards stores both of drugs and equipment, from the United Kingdom, there was enough to furnish troops going overseas with five months' supplies but, owing to the gross delay in receipts from England, this could only be done by drawing on the 1938 plan reserves and on civil stocks. A committee had been appointed under the Medical Adviser to the Secretary of State for India to expedite the despatch of India's requirements but it was generally agreed that as it was still necessary to go to the Director General, India Store Department, London, and as direct dealings with the Ministry of Supply were not allowed there would be delay in their receipt. However, once the troops then shortly about to depart were off no further anxiety as regards United Kingdom stores for overseas contingents was anticipated. These would be supplied, presumably, by the Ministry of Supply direct from the United Kingdom to the forces concerned. All that was to be done as regards stores from the United Kingdom was to replenish depleted reserves. The DMS thought, however, that there was some confusion on this subject and that the Middle East was still expecting us to supply the U.K. stores and continued to demand them for the whole of the Middle East.[6] The Secretary, Supply Department, stated that the Supply Department had prepared a forward programme, and as soon as sanction was received to go ahead with the production of drugs and instruments, the provision of medical stores would be included in it and the financing of the scheme of expansion would be dealt with by the Supply Department along with the other varieties of stores concerned.

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[6] This point was clarified early in 1941, when it was decided that the Middle East would demand only indigenous stores from India and that the supply of the U. K. Medical Stores to the Middle East was not a commitment of India.

WEEKLY TELEGRAMS OF SHIPMENTS

In order to have full information of the medical stores shipped from the United Kingdom to India, a system of weekly 'shipment telegrams' from the Director General, India Store Department, London, was started in July 1940, soon after the formation of the Medical Stores Committee in London and full details of important medical stores with quantities shipped and stating name of the ship and date of sailing were communicated in cypher to the DGIMS. This arrangement was stopped in 1943. As even after shipping instructions were issued to manufacturers, information as to whether items were actually shipped or whether a particular ship had sailed, were often not available for several weeks. It was, therefore, decided to adopt the following procedure:—

India Store Department to forward to the Medical Adviser at weekly intervals two statements:—

(a) Items ready for shipping; i.e., items for which shipping instructions had been issued
(b) Delays in shipment

This referred to all items in which delays of six weeks had occurred in shipment. The reasons for the delay were always to be examined and necessary action taken. These lists were then forwarded to India, to give indication of the progress which was being made in the completion of demands. In actual practice, however, it was found difficult to get any definite information about shipping.

ACTIVITIES OF THE MEDICAL STORES DEPARTMENT UP TO TAKING OVER CONTROL OF MEDICAL STORES FOR THE ARMY BY THE DMS (1941-43)

Great progress was made in the supply of indigenous medical stores after the commencement of the war and the number of items in the indigenous list progressively increased. The five Medical Store Depots and the factories attached to them served as educative nuclei to the trade. The Officers-in-Charge of the depots were in close touch with the local Controllers of Supply and through their agency indigenous industry both in drugs and instruments and appliances had been stimulated and expanded in every way possible. The position as regards the supply of indigenous medical stores could be described as satisfactory.

As regards imported stores, however, although a small portion was available locally through trade channels the supply was dependent partly upon proper and timely provisioning and also upon the time lag in securing compliance of indents from the United Kingdom which exceeded a year in most cases. It was, understood, however, that the time lag in the case of the imported medical stores was not normally greater than that in the case of ordnance stores. Occasionally, shipping losses detracted from the quantity of imported stores although such losses were invariably and promptly replaced by the Director General, India Store Department, London.

Five months' reserve of indigenous stores for 'Niblick' (a force from India for overseas) were ordered and heavy indents were received by the Medical Store Depots in addition, from the Middle East and the Far East, which were complied with in full. The 'U' list continued to be the basis of provisioning for maintenance and reserves of indigenous stores for the Middle East and the Far East. These were being built up according to a forward programme to be referred to hereafter. By April 1941, a total of 338 indigenous 'Us' were in place representing nine months' maintenance and two months' reserves for all commitments up to June 1941. Up to the end of 1941 a total of 436 'Us' (Indigenous) and 57 'U-B' (Indigenous) were collected according to the 'U' list scale. So far as the collection of imported 'Us' was concerned 133 'U' and 23 'U-B' were ordered from the United Kingdom.

Revision of the PVMS

Side by side with the expanding army new types of medical units were formed many of which required new and specialised equipment. The DMS attempted to counter these difficulties by convening a committee of experts which, in the first instance, started completely revising the PVMS. Only a few portions of the revised PVMS were received from the Medical Directorate by the first week of July 1941. The revision was not then complete and took several months for its completion. The new PVMS was based on the revised Medical Mobilisation Equipment Scales and had been revised to facilitate the building up of new field medical units. The new number given to PV items was also based to facilitate accounting by Hollerith System.

Revision of MME Scales

The scales according to which field medical units were required to be assembled underwent revision more than once since the commencement of the war. The first revision of the equipment scales was completed in February 1941, but this was by no means final, further revision being done later. The revised list was received in 1942 in the form of consolidated war scales. Separate scales for individual field medical units were also under preparation. The revised scales were prepared as a result of the recommendations of the Standardisation Committee of specialists and contained lesser number of instruments and appliances than in the previous scales.

REGIMENTAL FIELD MEDICAL EQUIPMENT

The total amount of regimental equipment ordered since the war commenced till the end of 1941 was as follows:—

Regimental Equipment (Full Scale)	340 sets.
Regimental Equipment (Modified scale)	339 sets.

Equipment for 277 sets (Full Scale) and 339 sets (Modified Scale) was completed and handed over to the regimental units concerned by December 1941, the balance of the equipment was completed and handed over by the middle of 1942.

PROGRAMME OF COMMITMENTS (FIELD MEDICAL UNITS)

This related to the raising of new field medical units. The first regular programme of monthly commitments from January to December 1941, was received in December 1940.

Later, a revised list was received in March 1941, giving monthly requirements of field medical units up to August 1942. It was later on considered necessary to speed up still further the building up of field medical units and another completely revised programme appeared in the beginning of June 1941. This programme showed units required from May 1941 to January 1942.[7]

The MME Scales for field medical units had once again undergone revision during the latter part of 1941. The revised additions to the scales were received from the Medical Directorate in November 1941.

By the end of 1941, scales for 32 different field medical units were constituted. A list of such units is placed below:—

Serial No.	*Name of Unit*
1.	*Air Force Squadron
2.	*Ambulance Transport
3.	Ambulance Train
4.	Anti-Malarial Unit
5.	Armd. Div. Field Hygiene Section
6.	Base Depot of Medical Stores
7.	Convalescent Depot
8.	Casualty Clearing Station
9.	Depot of Medical Stores
10.	*Dermatological Unit
11.	Ear, Nose and Throat Unit
12.	Opthalmological Unit
13.	Field Laboratory
14.	Field Hygiene Section
15.	Field Ambulance
16.	General Hospital Headquarters
17.	Heat Stroke Station
18.	Hospital Ship
19.	Hospital Ship Reserve
20.	Light Field Ambulance
21.	Motor Ambulance Section
22.	*Mobile Surgical Unit
23.	*Orthopaedic Coach
24.	Regimental Unit (Special)
25.	Regimental Unit (Full)
26.	Regimental Unit (Modified)
27.	River Sick Convoy
28.	Staging Section
29.	Sick Bay

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[7] See Appendix IV.

30. Supplementary Sick Bay
31. *First Aid Post P.A.D
32. *Field Dental Outfit

*Newly introduced.

Hospital Expansion

The programme of commitments regarding the raising of medical units and field medical equipment referred to above did not include the requirements for expansion of military hospitals in India for the reception of overseas casualties, prisoner of war camps, Indian rest camps, etc. The number of beds authorised for military hospitals before the war was 11,121. In 1941, it had increased to 30,421. In connection with hospital expansion, 12 Headquarters and 208 Sections of General Hospitals were ordered to be built up. Of this, equipment for 5 Headquarters and 97 Sections was collected by December 1941 and the balance completed by the middle of 1941. In addition, 6 Brigade Laboratories were ordered of which two were completed by December 1941 and four by the middle of 1942.

In connection with Hospital Expansion Scheme, following arrangements were made to meet the requirements:—

(1) The equipment was put up in sets for 100 beds according to the then revised scales for General Hospitals.
(2) The equipment was not packed in special General Hospital field boxes, but in ordinary packing cases, as it was all required in India.
(3) A set of special operating equipment according to the newly authorised scale for General Hospitals, was provided for every one thousand beds. If all the articles in the MME Scales were not available operating equipment sets were put up in modified form.
(4) For every one thousand beds, i.e., 10 Sections of the General Hospital, one Headquarter Section was provided.
(5) The following equipment which was considered essential by the DMS was also supplied as available:—
    (a) Ear, nose and throat equipment
    (b) Colour vision test apparatus
    (c) Kirschners and Bohlers fracture apparatus
    (d) Ophthalmic equipment
    (e) High pressure steam sterilisers

FORWARD PROGRAMME

The expansion targets which were periodically issued by the General Staff Branch, were analysed by the MGO Branch about October 1940, to prepare a forward programme of expansion. On this the DMS in consultation with the Deputy Financial Adviser (Ordnance), prepared the first forward programme for the procurement of medical stores in November 1940. This gave the estimated requirements of medical stores up to March 1943, in terms of 'Us' to be collected for the following:—

(i) Maintenance of troops in India 1941-42 and 1942-43

(ii) Frontier defence troops
(iii) Field Army (Maintenance of troops overseas–Far East and Middle East—1940-41 and 1942-43) and
(iv) Reserves

This programme was superseded by the revised programme received in March 1941, and took into account the full number of troops dependent, *viz*:

In India		4,30,000	
Overseas	(a)	2,97,000	1940-1941.
	(b)	5,40,000	April 1941 to June 1941.
	(c)	8,10,000	July 1941 to March 1943.

The stores were collected in terms of units representing the maintenance of stores required for a division of 35,000 men for one month and six months respectively.

Account was also taken of the extent of India's liability for the maintenance of the above troops, namely, the supply of both imported and indigenous stores to all the forces concerned other than the Middle East. For the latter India was to provide only indigenous stores.

These estimated requirements were accepted by the DMS. The DFA Ordnance (Military Finance), however, suggested that when the demands for the stores in question were placed by the DG IMS requirements for the maintenance of troops serving in India, as in the past, should be ordered along with the stores required for civil indentors, the ' stocks ' and ' dues in ' position being taken into account when the demands were framed. Also that the ' stocks ' and ' dues in ' against the standing war indents including the 3rd six monthly supply of stores ordered from the United Kingdom should be taken as assets.

The calculation under the head ' Reserves ' took credit for:—

(i) 108 ' Us ' of indigenous stores already ordered in August 1940, for 12 divisions for Middle East; and
(ii) the peace reserves (six months' indigenous and 12 months' imported stores) held or on order for Frontier Defence Troops. (Pink Plan).

Reserves in respect of 1940 expansion were understood to be covered by the demands for 40 'Us' (indigenous and imported) already placed by the DGIMS 15 'Us' and 9 ' U-Bs ' representing reserves for forces ' Niblick ' and ' Sabine ' were already ordered early in 1940.

No definite sum was allotted by the Military Finance Department to meet the cost of both imported and indigenous stores required for maintenance and reserve of troops overseas, the intention being to allot the funds according to the progressive expenditure which was difficult to anticipate readily owing to constant variation in prices. This system of sanctioning was measured according to progressive expenditure instead of on the basis of sanctions within a specified budget allotment. This was adopted by the military financial authorities throughout World War II.

The forward programme was finally approved by military finance authorities on 9 April 1941 and it was agreed that the DGIMS should order immediately the stores required. The final figures of the DMS's forward programme approved for maintenance and reserve are shown below:—

Statement showing Stores required for Maintenance of Forces Overseas (Middle East and Far East) and Stores required to be built up as Reserves for the same in Terms of U and U-B (Imported and Indigenous Stores)

Period: October 1940 to March 1943

U = Expendable
UB = Non-expendable

MAINTENANCE

Indigenous 'U'	Indigenous 'UB'	Imported 'U'	Imported 'UB'
(1st Objective up to and including June 1941—9 months)			
97·2	16·3	11·5	2
July 1941 to March 1942 (both inclusive)—9 months			
208·3	34·8	20·8	3·5
April 1942 to March 1943 (both inclusive)—12 months			
278	46·4	28	4·7
Total 583·5	97·5	60·3	10·2

RESERVES

	Indigenous 'U'	Indigenous 'UB'	Imported 'U'	Imported 'UB'
Mid East	187·5	31·3		
	(including 108U already arranged by MSD, Bombay)			
Far East ..	13·9	2·3	27·8	4·6
Frontier Defence ..	22·3	3·7	44·6	7·4
1940 Replacements ..	17·2	2·9	34·3	5·7
Total ...	240·9	40·2	106·7	17·7

GRAND TOTAL FOR THE TARGET

	Indigenous ' U '	Indigenous ' UB '	Imported ' U '	Imported ' UB '
Maintenance ..	583·5	97·5	60·3	10·2
Reserves ..	240·9	40·2	106·7	17·7
	824·4	137·7	167	27·9

The maintenance requirements in India were required on " war wastage " rates, while in calculating maintenance requirements in India according to the forward programme adopted previously by the Military Finance Department the cost of maintenance for 4,03,000 troops in India was assessed at peace rates of wastage. The revised figures are shown below:—

MAINTENANCE WAR WASTAGE RATES

Period	Strength	' U '		' UB '	
		Imp.	Ind.	Imp.	Ind.
1. *Maintenance—India* 4/41 to 3/42					
*Frontier Defence ..	1,35,000	23·1	23·1	23·9	3·9
Field Army ..	1,63,000	55·9	55·9	9·3	9·3
		79·0	79·0	13·2	13·2
4/42 to 3/43					
*Frontier Defence ..	1,35,000	23·1	23·1	3·9	3·9
Field Army ..	1,68,000	57·6	57·6	9·6	9·6
		80·7	80·7	13·5	13·5
Total ..		159·7	159·7	26·7	26·7
2. *Maintenance—Middle East*					
4/41 to 6/41 ..	4,86,000	..	41·7	..	7
7/41 to 12/41 ..	7,29,000	..	125·4	..	20·9
1/42 to 3/42 ..	7,29,000	..	62·7	..	10·5
4/42 to 3/43 ..	7,29,000	..	250·8	..	41·8
Total 4/41 to 3/43		..	480·6	..	80·2

*Calculated on half ' U ' and ' UB ' scale.

Period	Strength	'U'		'UB'	
		Imp.	Ind.	Imp.	Ind.
3. *Maintenance—Far East*					
4/41 to 6/41 ..	* 54,000	4·8	4·8	0·8	0·8
7/41 to 12/41 ..	81,000	13·8	13·8	2·3	2·3
1/42 to 3/42 ..	81,000	6·9	6·9	1·2	1·2
4/42 to 3/43 ..	81,000	27·6	27·6	4·6	4·6
Total 4/41 to 3/43		53·1	53·1	8·9	8·9
4. *Summary—Maintenance Requirements*					
4/41 to 3/42 ..		104·5	334·3	17·5	55·9
4/42 to 3/43 ..		108·3	359·1	18·1	59·9
Grand Total 4/41 to 3/43 ..		212·8	693·4	35·6	115·8

Reserves—Maintenance War Wastage Rates

Date required	Strength thousands	Period months		'U'		'UB'	
		Imp.	Ind.	Imp.	Ind.	Imp.	Ind.
1. *Reserves—India*							
By 12/41							
*Frontier Defence	135	12	6	23·1	11·6	3·9	2
Field Army ..	168	12	6	57·0	28·8	9·6	4·8
Total ..				80·1	40·4	13·5	6·8
2. *Reserves—Middle East*							
By 6/41 ..	486	..	9	..	125·1	..	20·9
By 12/41 ..	243	..	9	..	63	..	10·5
Total ..	729	..	18	..	188·1	..	31·4
3. *Reserves—Far East*							
By 6/41 ..	54	12	6	18	9	3	1·5
By 12/41 ..	27	12	6	9·6	4·8	1·6	0·8
Total ..	81	24	12	27·6	13·8	4·6	2·3
4. *Summary—Reserve Requirements*							
By 6/41 ..				18·0	134·1	3·0	22·4
Additional by 12/41 ..				90·3	108·2	15·1	18·1
Total by 12/41				108·3	242·3	18·1	40·5

*Calculated on half 'U' and 'UB' scale.

Troops Overseas (War Wastage as from October 1940)

(a) 1940-41

	No. of troops dependent	Estimated cost of indigenous stores Rs.	Estimated cost of imported stores Rs.	Total Cost of indigenous & imported stores Rs.
(i) 4/40 to 9/40 (Peace Wastage)				
Mid East	2,57,000	3,08,000	..	3,08,000
Far East	40,000	48,000	48,000	96,000
Total	2,97,000	3,56,000	48,000	4,04,000

	No. of troops dependent	Indigenous stores	Imported stores	Estimated Cost					
				Indigenous	U. Imported	Total	Ind.	UB-Imp.	Total
(ii) 10/40 to 3/41 (War Wastage)									
Mid East ..	2,57,000	44U 7·3UB	..	22,00,000	..	22,00,000	36,500	..	36,500
Far East ..	40,000	6·9U 1·2UB	6·9U 1·2UB	3,45,000	3,45,000	6,90,000	6,000	18,000	24,000
(b) 1941-42									
(i) 4/41 to 6/41 (War Wastage)									
Mid East ..	4,86,000	41·7U 7 UB	4·6	20,85,000		20,85,000	35,000	..	35,000
Far East ..	54,000	4·6U ·8UB	4·6U ·8UB	2,30,000	2,30,000	4,60,000	4,000	12,000	16,000

Troops Overseas (War Wastage as from October 1940)—(Continued)

	No. of troops dependent	Indigenous stores	Imported stores	Estimated Cost					
				Indigenous	U. Imported	Total	Ind.	UB-Imp.	Total
(ii) 7/41 to 3/42 (War Wastage)									
Mid East ..	7,29,000	187·5U 31·3UB	..	93,75,000	..	93,75,000	1,56,500	..	1,56,500
Far East ..	81,000	20·8U 3·5UB	20·8U 3·5UB	10,40,000	10,40,000	20,80,000	17,500	52,500	70,000
				(c) 1942-43					
(i) 4/42 to 3/43 (War Wastage)									
Mid East ..	7,29,000	250 U 41·7 UB	..	1,25,00,000	..	1,25,00,000	2,08,500	...	2,08,500
Far East ..	81,000	28 U 4·7 UB	28 U 4·7 UB	14,00,000	14,00,000	28,00,000	23,500	70,500	94,000
				2,91,75,000	30,15,000	3,21,90,000	4,87,500	1,53,000	6,40,500

(*Summary*)
(in lakhs of rupees)

1940–41 ..	33·55
1941–42 ..	142·78
1942–43 ..	156·02

Imported Stores for Maintenance and Reserves

For the imported stores, orders were placed by cablegram on London in December 1940.

Some of these orders were, however, held up as the military financial authorities insisted that the stock position and the 'dues in' including the orders placed on the Secretary of State in various indents received from the DMS should be taken into consideration before placing the orders. This was a difficult task and necessarily involved delay particularly as most of the war reserve and standing war indent stocks were spent in equipping the field medical units, which were not included at first in the forward programme. In the meanwhile, in view of the recommendations of the Principal Staff Officers' Committee in April 1941 that "the DMS should undertake the whole function of provisioning as understood in the MGO Branch with the exception that the DGIMS would continue to hold stores", the DMS in consultation with the military financial authorities decided to prepare their own indents for all their requirements, taking into consideration the military stock position and the 'dues in'. In view of this the proposed draft telegrams were withheld. No further action was taken by the DGIMS on the forward programme so far as imported items were concerned.

As regards indigenous items, the Medical Store Depots took vigorous steps to collect the indigenous 'Us' for the forward programme during 1941-42. These huge quantities of stores were handed over to the DMS in 1942-43, when military medical stores were transferred to the Army Medical Store Depots under the DMS.

The forward programme as originally received made no provision for initial equipment required for building up new field medical units but was a 'maintenance and reserve programme' only. 'Hospital Expansion Scheme' in India for casualties, prisoner of war camps, etc., was also not included in the forward programme. Estimates of maintenance and reserves for troops in India and troops overseas were only taken into consideration at first by the military finance authorities in their calculations.

As regards the initial requirements of medical stores required for building up new units, the DMS compiled a programme of commitments of medical units from month to month. This programme was necessarily frequently changed. This and the question of 'hospital expansion' have already been referred to earlier. Although both these measures were equally urgent and were entirely fresh commitments no provision as such existed for them and the Medical Stores Department was allowed to make local purchases and to draw on various war reserves which were being rapidly depleted, while at this stage the military financial authorities insisted on an accurate estimation of "stocks" and "dues in" before further orders were placed. This made the task of the Medical Stores Department all the more difficult as apart from the fact that excepting the war reserves which were kept separate the depots maintained combined working stocks for both civil and military purposes based on previous expenditure, no proper system of timely provisioning for the new war-time demands existed. This difficult situation was investigated in 1941 by the Principal Staff Officers' Committee.

FORWARD PROGRAMME—TEXTILES

Closely linked with the question of the forward programme of medical requirements for maintenance and reserves was the question of 'textiles'-bandage cloth, gauze, lint, cotton wool, etc., which formed an integral part of the requirements of the forward programme in terms of 'U' and for which orders had to be placed by the Director General of Supply on the India Store Department which dealt with the procurement of all textile articles.

The Director General of Supply ascribed the difficulties in connection with the forward programme for textiles to the following factors:—

(a) Changes in the strength of troops
(b) Changes in scales and patterns
(c) Local purchases of certain articles urgently required for which firm demands were already placed on the Director General of Supply
(d) Confusion due to change over of provision work from the DG IMS to DMS

During the progress of the war with an expanding army and with new types of field medical units being formed many of which required specialised equipment for which no prior provision existed, it became apparent about the beginning of 1941 that great difficulties lay ahead especially with an entirely new PVMS which was being drawn up by an expert committee appointed by the DMS to correspond with the revised scales of field medical equipment. At the same time the DMS placed all demands for medical equipment and stores on the DGIMS for procurement, stocking and distribution. There were alarming delays in the supply of imported medical stores ordered through the India Store Department and in this connection the following telegram was sent early in 1941, by the Viceroy of India to the Secretary of State for India, London:—

> "I am not at all happy about the situation in regard to medical stores ordered from the India Store Department. The great lag in supply now exceeding one year on the average not only makes the accumulation of reserves impossible but occasions the greatest difficulty in supplying initial equipment to troops going overseas. Production in India is developing well, but we are still dependent upon imports for many essential drugs and the majority of instruments and appliances. *Prima facie* it appears to us that the present system of supply through the India Store Department is not succeeding and that India's imperative outstanding requirements should be included in the War Office demand and be allotted priority by them. It appears that a separate small scale demand has little chance of securing requirements in competition with War Office, Admiralty and Air Ministry".

The question raised in the above communication as well as the question of shortages due to the then existing system of provisioning was taken up for consideration at a high level and a special committee was appointed for the purpose in April 1941.

Formation of the Principal Staff Officers' Committee, 1941: The main reason for the then existing shortages appeared to be that a store margin of only six months' of U.K. stores existed at the commencement of the war as compared with two years' store margin of U.K. stores during the previous world war. Also the store margin for entirely new articles introduced during the middle of the war into the revised medical mobilisation equipment scales numbering 575 items was virtually nil. Although the Medical Stores Department took prompt steps to increase the store margin of the U.K. stores to one year's requirements and indigenous stores to six months' requirements immediately on the declaration of hostilities and placed urgent firm demands amounting to about Rs. 14 lakhs these were not received until March 1941. The increase of store margin to one year was based by the financial authorities on peace time expenditure both civil and military which was increasing at a rapid pace. The mobilisation reserves in the Medical Store Depots at the commencement of the war were also scanty and could hardly amount to about one month's requirements. Steps were, however, taken by the Medical Stores Department in consultation with the Medical Directorate just prior to the commencement of the war to indent for five months' war reserves (Stock Lag) based on the 1938 Plan of Operation and also to place a revised and amplified standing war indent. Unfortunately, the stores received on these indents were being rapidly consumed as they arrived, due to various unforeseen commitments arising for the rapidly expanding army.

Apart from the original lack of reserves, it was felt, however, that the shortages were due to the then existing system of provisioning. A special high powered committee of the Principal Staff Officers at Army Headquarters with the Secretary, War Department, as its secretary was formed in April 1941, to consider shortages and it recommended suitable improvements in the system of provisioning. After due investigation the Committee made the following observations and recommendations:

Provisioning

Until October 1940, unrelated demands for one or two units at a time were placed by the DMS on the DGIMS which resulted in small supplementary indents being placed on the DGISD, London. The DGIMS first obtained a consolidated list of the units which could be foreseen and the dates on which stores for these units were required in October 1940 and was able to submit bulk indents to the U.K. for imported stores and to concentrate upon provision for those units which were given priority. In the existing circumstances sufficient time was not allowed to the branches concerned to ensure that supplies according to scale were made.

Fixation of Scales of Unit Equipment: The DMS endeavoured to ensure that medical units proceeding overseas were equipped on modern lines and from the middle of 1940, wholesale revision of scales of equipment for all types of medical units was taken up. It was noted, however, that no scales had been firm for any length of time and that the whole position of medical requirements for the war had been in a constant state of flux, especially during the early part of 1941. Equipment for all the new units, most of which had never been raised in India previously, had been demanded on the basis of the latest scales. Although much had been done by purchase from the trade all over India and obtaining some of the requirements from Central Research Institutes, it was becoming practically impossible for the DGIMS to comply with the demands. On the assumption that finality in the scales had been reached the time lag for compliance with indents was at least one year.

A further complication had been introduced by the fact that the DMS did not adapt the U.K. scales as they stood but based his revision of scales on the following factors:-

(a) U.K. scales
(b) Recommendations from forces overseas
(c) Recommendations from specialists in India
(d) Recommendations of the Medical Stores Supply Committee

With regard to drugs, a list showing the estimated requirements for one Section of a General Hospital (100 beds for one month) was submitted to the DMS in the Middle East who accepted the estimates with a few minor alterations. The recommendations of the Medical Stores Supply Committee were also examined, and as far as possible, indigenous substitutes were accepted for imported articles difficult to obtain. This estimate was used as the basis for drawing up the drug requirements of all other units. The DGIMS and his organisation were, however, not consulted at any stage as to the practicability of the new scales *vis-a-vis* the supply position.

PROVISION ACTION

Provision action included the fixation of scales of reserve and store margins, calculation of a long-term programme of future requirements including reserves and store margins leading up to placing firm indents on suppliers. The provision action taken by the Medical Directorate may be summarised as follows:-

> *Initial Equipment:* It was normally the practice of the Provision Sections of the Medical Directorate to forward to the DGIMS not itemised indents but mere demands for medical units on approved scales. Details of requirements had to be worked out by the staff of the DGIMS. In the case of new units included in the 1940 Expansion Scheme, the simple procedure had to be given up as the new scales had not been completed and the detailed demands were placed with the DGIMS. Over 30 separate demands were made between July and October 1940. In December 1940, a programme of commitments was issued by the Medical Directorate, showing by months the units required to be built up in 1941. The list of expendable stores representing the maintenance requirements of all field medical and regimental units in one division was compiled.

It did not appear that any systematic calculation of store margins was carried out in the DMS's office in the preparation of his demands for initial equipment nor was it clear that the maintenance calculations were closely co-related with those for initial equipment (i.e., the 'U' and 'U-B' lists did not cover all items of unit equipment).

The practice in the MGO's Provision Office was to indent:—

(a) for the actual requirements of unit's initial equipment,
(b) to add a 'store margin', and
(c) to order 12 months' maintenance at war wastage rates.

The store margin was not a reserve but was intended to cover any error in estimating and any fluctuations in supply and demand. In the case of the U.K. stores, a six months' store margin was to be taken. There was very great difficulty in allocating stocks definitely in time of war owing to sudden and unexpected demands which were constantly being made and the only remedy was to have sufficient store margins.

World War II started with a shortage and the inadequate and unsystematic method of provisioning that was followed undoubtedly further delayed the lengthy process of catching up.

In July 1940, the DMS examined in consultation with the MGO the formation of a Provision Branch in his office, but the only action taken on this was a recommendation that either a trained ordnance officer be posted, temporarily at any rate, to the Medical Directorate to instruct the Provision Section or that an officer or officers should be sent for training to the office of the DDOSP.

SUPPLY

The system adopted for the supply of (a) Indigenous Stores and (b) Imported Stores was as follows:—

(a) *Indigenous Stores:* As indicated above great progress was made in the supply of indigenous stores and the number of items in the indigenous list had been progressively increased. Five months reserve of indigenous stores for 'Niblick' had been ordered and heavy indents were being received in addition from the various depots of medical stores in the Middle East which were being complied with in full. At the same time maintenance and reserve of indigenous stores for the Middle East were being built up and it was expected that by June 1941 a total of 338 indigenous 'Us' would be in place representing nine months' maintenance and nine months' reserve for all known commitments up to June 1941. The position as regards the supply of indigenous stores, could fairly be described as good and there was no doubt that the organisation of the DGIMS could not be better in this respect. In this connection, it was observed that indents were now being received tending largely to modify the initial conception of the 'U' list and the time had come to revise it in the light of experience.

(b) *Imported Stores:* As regards imported stores, the supply was dependent partly upon proper provisioning. The question as to whether the time lag of one year could be reduced by a change of the system whereby indents were placed upon the DGISD, London, had been exhaustively examined. *Prima facie* it appeared that comparatively small demands placed on the DGISD, London, would have little chance against the demands of the War Office, the Home Office (U.K.) and the Ministry of Health (U.K.). In spite of this fact, the time lag in the case of medical stores was not normally greater than that in the case of ordnance stores. Two suggestions for alleviating the shortages caused by lack of adequate reserves at the beginning of the war, and protracted time lag, had not been favourably received by the British Government. The first was that the War Office should take over from the DGISD the responsibility of meeting India's demands and the second was that a medical officer should be despatched to the U.K. to assist the British Purchasing Commission in obtaining India's urgent requirements from the United States of America. Another possible solution was to obtain automatic shipments of medical stores from the U.K. on a percentage basis of U.K. production.

Apart from the original lack of reserves, the shortages were entirely due to the then existing system of provisioning. It had been a matter of the greatest difficulty to discover the exact position and the Committee could not pretend that they had succeeded in doing so. The war was started with no real reserves and only some six months' working stocks, apart from the equipment for the 1938 Plan of Operation which was located in the Medical Mobilisation Stores. With a time lag of at least one year between demand and supply coupled with the strain on India's resources caused by demands for equipment of new units and re-equipment of old units on a scale never contemplated before, the building up of substantial reserves had been impossible. The flow of receipts of supplies was perhaps just about balanced by issues. In meeting these demands, considerable inroads were made into the medical stores earmarked for the 1938 Plan of Operation and this stock was fast dwindling. Thanks to the efforts of the DGIMS's organisation a very large amount of instruments, appliances and drugs was issued for military purposes and it is probably not too much to say that the Medical Directorate had received about 50 per cent. more than they could possibly have expected.

Complete supplies on three standing war indents should have been received in India, but in the first instance, 884 items were received out of 1,027 and later 97 items were received out of 549. The demands made in the third indent were not met. A large additional indent to cover stock lag, had also failed to materialise. However, it was possible to provide medical units required for 'Sybil' with certain gaps to be filled up later. But if this were done, the reserves of imported stores in India would undoubtedly be gravely depleted and the only method of collecting them in an emergency arising in India would be to exact contributions from civil hospitals all over the country.

The Committee summarised its above report by the following remarks:—

> " The causes of this state of affairs were:—
>
> (a) Absence of adequate reserves at the beginning of the war.
>
> (b) Faulty system of provisioning whereby orders were placed piecemeal for the units to be raised from time to time and no efforts were made in the direction of provision until the end of 1940 with consequent placing of bulk demands. The remedies suggested were (1) a proper system of provisioning which in time would

> rectify the then existing state of affairs and (2) to deal with the immediate problem—either a substantial and immediate release of stores from the U.K. or early shipment from the U.S.A. "

On the basis of the recommendations made by the Committee, it was decided that the DMS should undertake the whole function of provisioning with the exception that the DGIMS would continue to hold the stores.

The above decision implied that the DMS was responsible in respect of medical stores for:—

- (i) Estimating the total amount of stores in detail for:—
  - (a) initial equipment of new units,
  - (b) maintenance for all military units in India,
  - (c) maintenance for all military formations overseas to the extent *India had accepted responsibility*, and
  - (d) authorised reserves for (b) and (c) above.
- (ii) Placing itemised demands for the stores for the above purpose on the DGIMS.

In order to comply with (i) above, it was considered necessary for the DMS to know what stores were being issued from stocks so that he would be in a position to correct his original estimates in accordance with actual facts. This necessitated periodical reviews of stock position. The DMS also considered that he must know what stores had been received against any particular demand in order that he may know whether any unit could be completed by due date or whether he had sufficient stores for maintenance and reserves for any particular formation for which he had accepted responsibility.

In other words, if the DMS was to carry out the whole function of provisioning, he should have complete knowledge of what stocks were held and where by the DGIMS on his behalf, the 'dues in' and the 'dues out' to enable him to frame his demands accurately. It was essential also that the stores at the disposal of the DMS, held in the DGIMS's store depots, were accounted for separately from those held by the DGIMS for his own purposes.

The first step towards implementation of the above recommendations of the DMS, which were agreed to by the DGIMS, was taken in August 1941, when arrangements were made by the DGIMS to distinguish stocks in depots as 'civil' and 'military' as required by the DMS, separate ledger cards being introduced. No physical separation of the military as distinguished from civil stocks was made at this stage.

Difficulties were encountered in the matter of allocation and distribution between the military and civil stocks of such articles as were indented for from the U.K. on the 'quota' basis, and other receipts from the U.K. against indents military or civil. It was decided by the DGIMS in consultation with the Medical Directorate that the distribution of receipts of all imported articles both on quota basis and others including all indents, military or civil or mixed, old or new, would be in the rates of 9/10th to military and 1/10th to civil in the case of drugs, and 19/20th to military and 1/20th to civil in the case of surgical instruments and appliances. This was considered a fairly liberal allocation so far as military needs were considered and provision was made to change the proportions whenever it was considered necessary to do so. In practice, however, hardly any readjustments were made as the military requirements were heavy compared to the civil. The assistant inspector of medical stores was responsible for the division of the stores. This procedure did not apply to consignments received in India from the U.K. as reserves and maintenance for British troops sent as reinforcements ex-India and which had no reference to any indents placed by the DGIMS on the U.K..

Even after the responsibility of entire provisioning of medical stores for the needs of the armed forces was taken over by the DMS there was increasing complexity in problems of supply and demands of medical stores for both military and civil needs, owing to the fact that the DGIMS still held stocks both civil and military in his depots. This led to increasing difficulties in correlation and administration and it became apparent that physical separation of the two branches would eventually be inevitable. The preliminary steps taken in August 1941 ultimately led to almost complete separation of the civil and military medical supply organisations.

As soon as the stocks were divided, in order to keep the DMS fully informed of the stock position, the depots were asked to submit monthly and quarterly stock returns of military stores to the DMS who established a central stock control branch in his office for the correct stock accounting of medical stores (military). After the depots had sent the first return of military stocks on 1 September 1941, copies of vouchers (receipts and issue transactions) had to be sent to the DMS from all depots to enable him to keep his ledgers posted up-to-date. Such transactions ran into thousands and this scheme in practice did not prove to be a success and had to be discontinued. The depots were then asked to furnish fresh monthly and quarterly stock returns of military stores on special proformas, showing stocks in hand ' dues in ' ' dues out ', etc. Experience proved very quickly that this type of co-ordination also was not satisfactory in actual practice and at this stage attention was drawn by the DMS to a number of serious disabilities inherent in the then prevailing organisation of Medical Store Depots. The disabilities referred to by the DMS were briefly as follows:—

1. *Overseas Supplies:* Information at the centre regarding compliance with indents by MSDs was most meagre. This especially affected maintenance indents from overseas. Although the DMS was directly responsible for medical supplies to overseas forces, after passing an indent from an overseas depot medical stores to the DGIMS, he could take no further active interest in it apart from checking the issue voucher against the indent. He had no control over the issue, nor was he in a position to inform the overseas depot medical stores how long it would be before any particular indent was met. Furthermore, the DMS, who was directly responsible for adequate medical supplies to overseas forces, could not know with any degree of accuracy what stores were available with a particular force and was unable to answer queries from overseas as to the exact position regarding supply. This was liable to lead to over-supply by the DMS in his care to insure that the force did not go short.

2. *Stock Position:* The DMS could not be certain of the stock position as there was little conformity in the stock returns from the depots and particularly as the civil and military stores were stocked together excepting perhaps the mobilisation reserves. The DMS was also not in a position to inspect the stores held on his behalf by the DGIMS and to assure himself of their storage conditions.

3. *Initial Equipment and New Units:* The Medical Store Depots naturally insisted on issuing stores for initial equipment only in accordance with the pre-determined and sanctioned programme. As the programme of commitments was being constantly altered by the General Staff Branch at short notice this led to confusion and delay. These factors resulted in the DMS being ' caught short ' and collection of equipment was hurried and piecemeal. As a consequence of hurried packing and checking and repacking, breakages and deficiencies were high. The practice of constant hurrying also led to a large number of ' hereafters' which often arrived after the units had departed and later remained unclaimed at various places and railway stations all over India without the DMS being aware of it.

The DGIMS was naturally averse to issuing initial equipment unless he was satisfied that official sanction for the units to be raised had been obtained. The DMS's viewpoint was that the responsibility for obtaining official sanction to the building up of field medical units by the DMS in anticipation of sanction, out of stocks, were his own, although it was understood that local purchases on a large scale had very often to be made by the DGIMS to make up the deficiencies.

4. *Imported Stores:* Once the DMS had submitted indents on the DGIMS he had no effective control or adequate information regarding the stores to enable him to do forward planning and disposal of the stores, unless he took over the imports both civil and military on arrival at the port and was in possession of all information about the shipping of imports.

5. *Shipping Difficulties:* Both the QMG and the Embarkation Commandant, Bombay, had expressed their dissatisfaction regarding the handling of the whole organisation for import and export of medical stores and the DMS's contention was that difficulties were bound to persist until he had taken control of military stores in and out of India. He would then be in a position to comply with the QMG's instructions regarding shipment of stores. He would be able to supply correct shipping forecasts when he had information about the dead weight and cubic capacity while the DGIMS's shipping forecasts were only approximate, since unlike the DMS he was not in possession of factors likely to increase or decrease future shipments. On the other hand the DMS knew the probable increase in strength overseas and other factors likely to affect monthly demands for stores.

6. *Inspection:* The DMS did not consider that the then existing system of the DGIMS's procedure for inspection was satisfactory, as it contravened the MGO's accepted principle that in no case should the manufacturer and/or the supplier should exercise the function of inspection. At this stage, a case for transfer of inspection of medical equipment and stores from the control of the DGIMS to the MGO Branch was under contemplation.

In January 1941, attention was drawn by the DGIMS to the need by the DMS of relieving Medical Store Depots of completed sets of equipment and packed ' U ' lists, as the depots were packed with this equipment. The general dividing line that all such completed units should immediately go over to the Medical Mobilisation Store Depots was agreed to by the DMS, although in practice this could not be easily accomplished.

In June 1941, a small committee was appointed to revise the drugs items of unit equipment and of the ' U ' list. Two officers of the DGIMS, namely, the Chief Advisory Chemist and the Director of Production, Drugs and Dressings, served on this committee.

In December 1941, revision of ' U ' list was undertaken. Middle East was asked to state if they would reduce or dispense with some items.

CHAPTER II

Formation of Army Medical Stores Department

The medical stores organisation in India under the DGIMS was instituted originally for military stores only. The scope of this organisation was later extended to include civil departments. Gradually non-government institutions could also be supplied with medical stores by this organisation. To augment the supply of various medical stores, manufacture of certain of these stores was started in the Medical Store Depots. During World War I, the manufacture of drugs in these depots had considerably advanced.

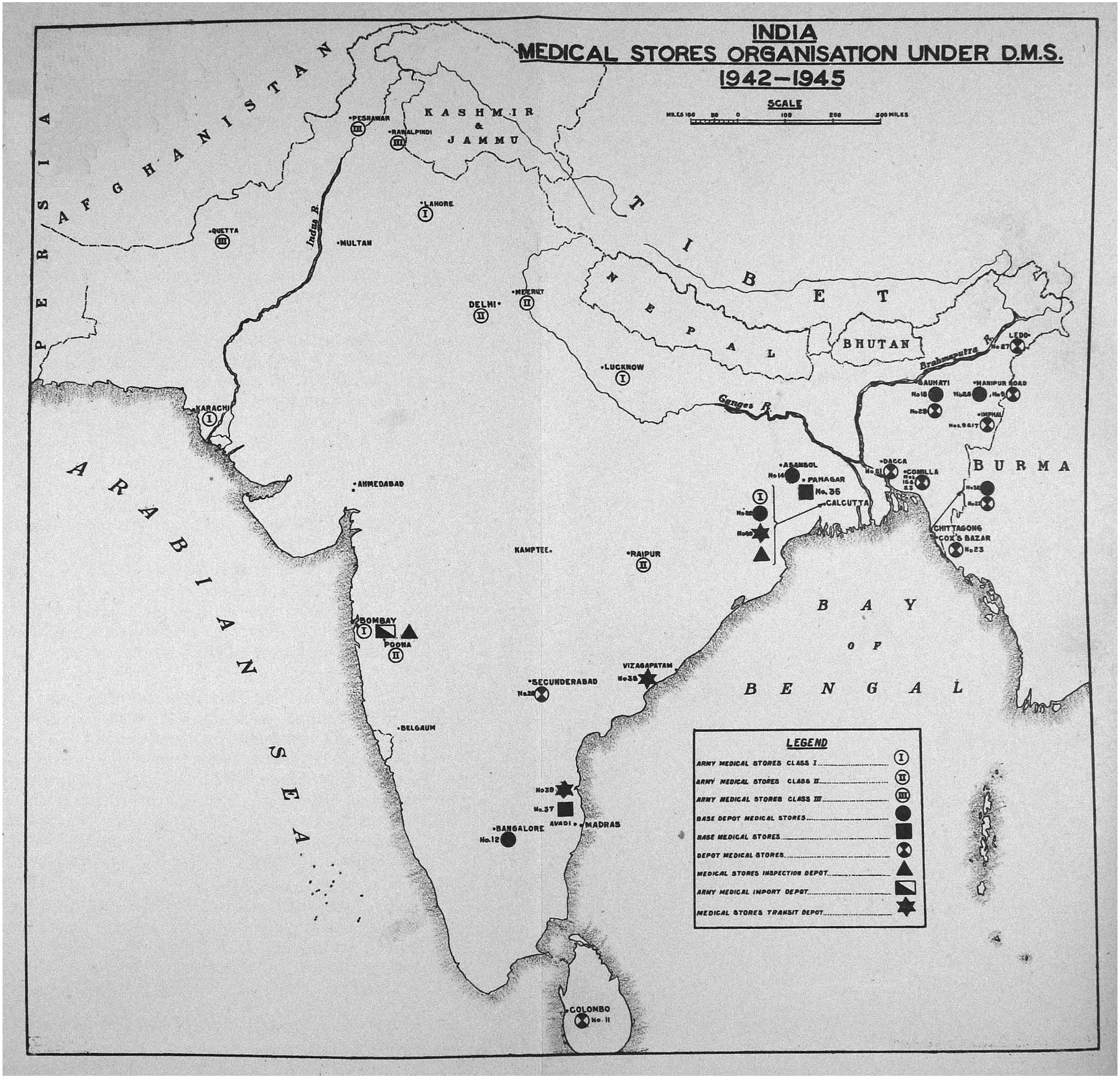
The arrangement for the supply of medical stores was peculiar. The DGIMS operated an organisation, paid from the defence estimates but concerned predominantly with civil needs. He performed all the supply functions (provisioning, stocking and distribution), and not only purchased the medical stores both in India and abroad, but also manufactured some stores in his depots. The DMS controlled the seven Medical Mobilisation Stores located at Rawalpindi, Peshawar, Quetta, Lahore, Lucknow, Meerut and Poona, where the equipment and stores received from the Medical Stores Depots of the DGIMS were stocked for the field medical units, and kept ready for the immediate needs of mobilisation.

At a meeting held on 3 April 1942, it was decided that in view of the altered conditions in India which was now virtually a theatre of war, the DMS in India should assume physical control of military medical stores for supplying to the armed forces and consequently the DMS should arrange to take over all military stocks from the Medical Store Depots of the DGIMS.

It was agreed in consultation with the AG in India that the change over from the control by the DGIMS to the control by the DMS should be gradual so as not to interfere with the steady flow of supplies and that since new stores organisation always presented new and difficult problems, it was decided that the DMS should only take over immediately such stocks as he could conveniently handle and operate. Nothing was to be moved until accommodation was ready. In response to the DMS's desire to control his own stores, it was also agreed towards the end of 1941 that the details of the transfer should be settled between the DGIMS and the DMS.

Immediate steps were taken to implement the policy outlined above. Consequent on the decision of transfer of responsibility from the DGIMS to DMS in India with regard to the supply and distribution of medical stores, orders in the first instance for handing over the following accommodation were issued in December 1941 by the QMG in India:—

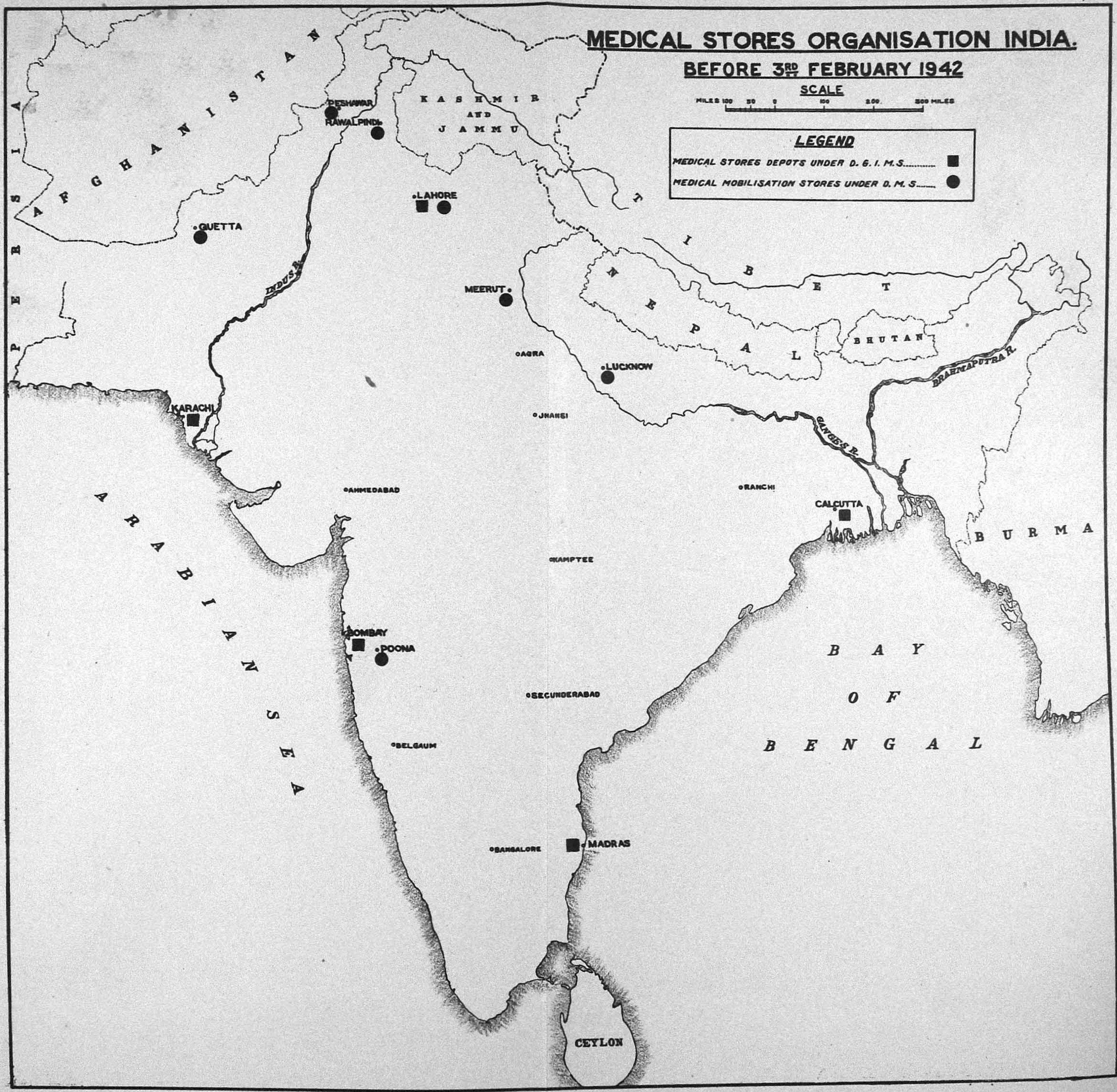
(1)	The newly formed Medical Store Depot, Karachi	78,000 sq. ft.
(2)	The Grid, Lahore Cantt.	7,000 sq. ft.
(3)	Napier and Probyn Lines, Lahore Cantt. ..	14,000 sq. ft.



INDIA

MEDICAL STORES ORGANISATION UNDER D.M.S.

1942–1945



MEDICAL STORES ORGANISATION INDIA.

BEFORE 3RD FEBRUARY 1942

(4) Sub-depot of M.S.D., Bombay at Mahim .. 18,000 sq. ft. (Total accommodation was 1,50,000 sq. ft. out of this only 18,000 sq. ft. had been rented by the DGIMS)[1]

In this connection, the QMG also sanctioned the building up of a new Army Medical Store Depot at Lahore Cantonment with a total accommodation of 40,000 sq. ft. Along with the accommodation the corresponding staff was also transferred to the DMS in India.

At a meeting held on 9 December 1942, between the representatives of the DGIMS, the Medical Directorate, the QMG's Branch, the Military Finance Department and the AG, it was decided that the following MSD accommodation available with the DGIMS should be handed over to the DMS in India:—

(1) A part of the newly formed Raipur Depot containing Local Provision Office (military stocks) to the extent of 1,29,000 sq. ft., out of a total accommodation of 2,54,000 sq. ft.

(2) Godown at 209 Lower Circular Road, Calcutta, of which 27,000 sq. ft. were occupied by Local Provision Office (Military) stocks.

Although under the orders of the AG in India the depots had to transfer their military stocks as and when accommodation became available to the newly formed Army Medical Stores including the Medical Mobilisation Stores which were converted into Army Medical Stores, this process of transfer of stores and personnel and the physical separation of civil and military stocks was continued for months together and had to be done piecemeal, being completed finally in 1943.

The process of transfer resulted in a certain amount of dislocation in the working of the depots, particularly in the accounting work of the stores leading to confusion and complaints. There was no doubt that a good deal of the trouble and the difficulties consequent on the separation in the middle of the war would have been avoided if dual control had not existed and there was one controlling authority for the whole organisation of the Medical Stores Department instead of two. As war was in progress, it would have been simple if the DMS was permitted to take over the whole organisation during the war which would have avoided duplication and a large amount of extra expense to the State.

As stores for the army were steadily being transferred to the newly formed military Medical Store Depots the DGIMS became gradually less and less concerned with military medical supplies except for the overseas theatres of war and to the Eastern Group countries outside India which responsibility continued to be vested in him throughout the war and until the cessation of hostilities which resulted in the winding up of the CPO in 1946.

The DGIMS stated that the Medical Adviser to the Secretary of State was pressing for India to adopt the 'Quota' system with regard to her military requirements. 'Quota' basis had been applied so far to only a few items such as cocain. In this connection, the Military Finance representative pointed out that initial demands would not be placed on a quota basis, but that in the case of demands for maintenance over a given period the DMS was in fact stating a quota for certain items. Bulk demands were placed on the U.K. by India and if supply fell short of these demands, it was up to the U.K. to put the particular item on quota basis. In effect, the quota system could only be applied at the U.K. end, and not in India. This was generally agreed to. It was also agreed to compile new demands based on stock position.

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[1] The maps indicating the position of Medical Stores Organisation India before February 1942 and India Medical Stores Organisation under DMS (1942–1945) are placed opposite. See *Administration*, Medical Series, p. 337.

Introduction of Monthly Quota System of Supplies from the U.K.

At a meeting of the India Office Medical Stores Committee, London, held on 16 July 1941, the question of the possible requirements of India was discussed. " It was agreed that the knowledge of the state of market and the difficulties experienced by manufacturing firms pointed out to the necessity of placing contracts on a long-term basis as soon as possible. The demands of medical stores from India always consisted of several hundred different requirements and the time taken to place them was considerable, while considerable delay could always be avoided if the manufacturers had information in advance by which they could plan their programme of work. It was also desirable that a number of these items should be placed on monthly supply basis, a method which was not only convenient to the makers but was a great convenience in shipping. A monthly quota minimised the loss from enemy action at sea and where smaller quantities were demanded they could be sent regularly by parcel posts, as was being done already for certain items like syringes, etc."

A list of drugs and a list of articles other than drugs which the India Office considered could be placed on monthly supply basis was communicated to the DGIMS. Some of these items were already on running contracts, such contracts of course had break clauses which could be put into effect if the war stopped.

DRUGS FOR QUOTAS

List 1

1. Pamaquin
2. Dagenan
3. Argento proteinum mite-tabs
4. Hypodermic tablets
5. Phenol
6. Phenacetin
7. Neoarsphenamina
8. Sulpharsphenamina
9. Procaine hydrochloride
10. Sulphanilamide
11. Acriflavine-tabs and powder
12. Perchloride tablets
13. Paraldehyde
14. Bromides
15. Iodides

List 2

16. Bleaching powder
17. Bismuth carbonate
18. Acetylsalicylic acid
19. Salicylates
20. Benzoic acid
21. Benzoates
22. Boric acid
23. Citric acid
24. Ammonium carbonate
25. Chloroform
26. Nikethamide
27. Hexamine
28. Mercury salts
29. Iodine
30. Iodoform
31. Hydrogen peroxide
32. Foromaldehyde
33. Sodium bicarbonate

ARTICLES OTHER THAN DRUGS FOR QUOTAS

34. Catheters C.E.
35. Clinical thermometers
36. Adhesive plaster
37. Bandages elastic
38. Syringes
39. Ligatures sterilised
40. India Rubber stores
    (a) Enemas
    (b) Icebags
    (c) Catheters
    (d) Tubing, drainage
    (e) Operation gloves

In spite of the introduction of the quota system, increasing difficulties were felt during 1941-42 in securing adequate supplies of medical stores and equipment from the U.K. owing to:—

(1) the rapid increase in the number of new medical units to be raised,
(2) the increase in the number of units dependent, and
(3) the delay in receipt from the U.K. of orders already placed with the result that the then existing resources in India had to be drawn upon to a dangerous degree.

To meet the situation and to ensure that there should be no breakdown in the provision of units for overseas, the DGIMS during the early part of 1942 requested permission to place orders in the U.S.A. for six months' supply of urgently required imported stores (including initial equipment for units to be raised during the first six months of that year). The sum involved was calculated approximately at Rs. 50 lakhs as shown on the next page.

		Rs.
(1)	Initial Equipment	13,90,000
(2)	Expansion in India, Overseas Casualties, Prisoners of War and Requirements for the Far East—	
	Imported U.-50	31,44,000
	Imported U.B.-20	4,26,000
(3)	Veterinary Requirements..	40,000
	Rs.	50,00,000
	or £	3,75,000

In the event of the above measure being sanctioned the DGIMS had proposed to send an officer to the U.S.A. to purchase requirements. This proposal, however, did not materialise as the responsibility for provision and procurement no longer rested with the DGIMS, the former being transferred to the DMS in India and the latter to the Director General, Supply Department.

CHAPTER III

Supplies Overseas

Reference has already been made in the previous chapter to the various expeditionary forces equipped with reserves of medical stores which were moving or had moved from India to overseas destinations, (' Emu ', ' Heron ', ' Hawk ', etc.,) and later groups of forces connected with the 1940 expansion (' Herring ', ' Trout ', ' Rainbow ', etc.). India was thus responsible for medical supplies for the army in India and also for certain commitments overseas in collaboration with the British Government particularly, for the indigenous portion of medical supplies for the army in the Middle East, and for both civil and military supplies for the Far East. To deal with questions of medical supplies to overseas countries in the Commonwealth particularly in relation to the eastern theatres of war the Eastern Group Supply Council and the Central Provision Office were eventually established.

The order of priorities assigned by the Government of India for supplies from India of medical stores inland and overseas, during the war was as follows:—

(1) Military, India (including all overseas commitments of the DMS in India, i.e., Iraq, etc.).
(2) Civil, India (Essentials).
(3) Eastern Group Supply Council.
(4) Other countries.

The responsibilty of the DGIMS with regard to supply of medical stores to various war zones overseas was as follows:—

(1) *Middle East:* The DGIMS was responsible for the supply of indigenous items only to Middle East. In the early period of the war, however, both indigenous and imported items were supplied.

(2) *British Forces in Iraq:* India was responsible for the supply of all medical stores (indigenous as well as imported) to the forces in Iraq.

(3) *Far East:* Ceylon, Mauritius and Burma: India was also committed to the extent of supplying indigenous manufactured stores to Burma provided they were available. The Secretary of State for India had instructed Burma to obtain from India supplies of indigenous drugs, etc. About the latter part of 1941, Burma was, therefore, asked to send a forward programme to India.

(4) *Overseas States:* Indigenous medical stores which were surplus to India's requirements were supplied during the war to the following States: (i) Federated States of Malaya, (ii) Saudi Arabia, (iii) South Africa and (iv) New Zealand.

The position regarding the troops overseas to be catered for by India changed rapidly since August 1940, and the peak figure for troops in the Middle East to be reached by March 1942, was 7,29,000, while for troops in the Far East the peak figure to be reached in March 1942, was 81,000 men.

A strength of nine divisions excluding three divisions based on India was planned for the Middle East in July 1940[1]. By early 1941 Middle East was planning for a possible 17 divisions by June 1941 and 23 divisions by the end of 1941. The policy for expansion of forces overseas in this connection was laid down in telegram No. 6340, dated 17 October 1940, and telegram No. 6490, dated 23 October 1940, from the Secretary of State for India which completely altered the picture and instead of 12 divisions overseas, it became very soon a problem of 27 divisions overseas. Hence the increasingly large demands on India from overseas for medical stores which had considerably puzzled the Medical Stores Department in India until the position was explained by the DMS, GHQ, Middle East, in February 1941.

OVERSEAS COMMITMENTS—CODE NAMES FOR FORCES CONCERNED

The following is a list of names of forces other than those expeditionary forces at the beginning of the war, for example, ' Emu ', ' Heron ', etc., referred to already, concerned with overseas commitments.

(a)	' Sabine '	This force was intended for Iraq and was composed as follows—Two divisions from Middle East *plus* one division from India *plus* Base and Line of Communication units.
(b)	' Niblick '	This was part of ' Sabine ' mentioned above. Of the units mentioned above against 'Sabine', one infantry division from India (' Rufus ') *plus* non-divisional units, i.e., certain Base and Line of Communication units were known as ' Niblick', 'Sabine' was thus constitued as follows:—

One infantry division (' Rufus ') Non-divisional units	' Niblick '	' Sabine '
Base and Line of Communication units One British infantry division One Indian infantry division	From Middle East	

The British Government, however, in October 1940, wanted ' Sabine ' to be reconstituted with the exception that the two divisions which were to have come from the Middle East were to come from India and both were to be Indian.

A new ' Sabine ' was thus reconstituted as follows:—

Base and Line of Communication units (on order for ' Sabine ')		' Sabine '
8th Infantry Division		
6th Infantry Division		
10th Infantry Division ('Satire') to replace 'Rufus' Non-divisional units (i.e., the remnant of 'Niblick' made up to original strength)	'Sybil'	

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[1] War Office Code No. 75860, dated 9 July 1940.

(c)	'Rufus'	The 'Niblick' Division referred to in (b)—5th Division.
(d)	'Sybil'	The replacement of 'Niblick' referred to above consisting of 10th Division (to replace 'Rufus'), balance of 'Niblick' being then still in India awaiting completion of new units.
(e)	'Satyr'	Replacement of 'Rufus'.
(f)	'Capable'	9th Division *plus* certain non-divisional troops.
(g)	'Dirigible'	Consisting of 6th Brigade ('Abnormal') and 8th Brigade ('Bunker') both of which had proceeded overseas.
(h)	'Assurance'	3rd Motor-car Brigade for Scychelles.
(i)	'Armour'	The Indian Garrison Co. for Scychelles.

OVERSEAS COMMITMENTS—CHANGES DURING 1940-41

A number of changes had taken place affecting India's overseas commitments, the position being somewhat as follows:—

(1) The 1940 Expansion Scheme was originally intended for the defence of India's Western Frontier against invasion, the medical units for which were already ordered as detailed below:—

1940 Expansion

Medical units for which equipment and stores were ordered in August 1940:—

			Number
1.	Field Ambulances		12
2.	Field Hygiene Sections		8
3.	Casualty Clearing Stations		4
4.	British Staging Sections		1
5.	Indian Staging Sections		4
6.	Depots Medical Stores		2
7.	British Convalescent Depot		1
8.	Indian Convalescent Depot		1
9.	X-rays Units		10
10.	Anti-Malarial Units		4
11.	Mobile X-ray Units		7
12.	General Hospitals		
	Headquarters	13	
	British Sections	14	
	Indian Sections	95	
13.	Motor Ambulance Sections		2
14.	Cavalry Field Ambulances (Armoured Brigade)		2

(2) The British Government required further help from India for overseas commitments. India, therefore, offered certain formations of her own 1940 expansion, namely, four infantry divisions and one armoured division. India, therefore, decided that one of the infantry divisions constituting the 1940 expansion would be kept for India's defence, while the four infantry divisions and one armoured division offered to the British Government

would be replaced to make up India's requirements for her own defence. These replacements were known as the 1941 replacements.

(3) On the assumption that the British Government would accept the offer of the formations referred to above, the General Staff Branch, Army Headquarters, India, issued a programme for raising these divisions and their replacements. The four infantry divisions were accepted, the armoured division was not required. In lieu one motor cavalry brigade and one extra-infantry division were required and the details were as follows:—

One infantry division—May 1941—for Malaya
One infantry division—July 1941—for Iraq
Two infantry divisions—August to December 1941—for Iraq
One motor cavalry brigade }
One infantry division } for Middle East

India accepted these demands and based the new 1940 expansion programme accordingly. When India's known commitments were despatched overseas and when the 1941 replacements were made up the picture was as follows:—

In India:	Frontier Troops	
	I.S. Units.	
	Field Army	7th Infantry Division. Replacements of four divisions offered to British Government 23rd Brigade—Two Armoured Divisions Force troops. Base and Line of Communication units
In Malaya:	'Emu'	(6th Brigade & 8th Brigade) 'Dirigible' Forming a new division 9th Infantry Division Non-divisional troops } Later known as 'Capable'
In Egypt & the Sudan:		4th Indian Division (with 14th Infantry Brigade from Palestine). 5th Indian Division ('Rufus') Portion of non-divisional troops of 'Niblick', one reserve division, etc.
In Iraq:		'Sabine' consisting of 3 infantry divisions, non-divisional units, Base and Line of Communication Units ('Sybil' forming part of 'Sabine' consisted of the 10th Infantry Division *plus* non-divisional Units)

Maintenance—Iraq Force: By the end of June 1941, Iraq Force was estimated to be composed of 49,000 troops, and by the end of August 1941, of 62,000 troops. As this force was dependent on India, India had not only to arrange initial equipment for it, both indigenous and imported, but also maintenance and reserves in both indigenous and imported stores.

At a conference held on 26 July 1940, it was agreed that drugs on the indigenous list and required for overseas provisioning should be divided into three parts, as shown on the next page.

(a) Those that were easy i.e., which could be manufactured in sufficient quantities for India's commitments overseas in addition to her own needs.

(b) Those that were difficult, i.e., although manufactured in India the maximum output of which was not certain or was limited.

(c) Those which it was not possible to supply in the quantities required and the manufacture of which would necessitate additional machinery in which there would be a delay of about a year or more.

Following this division the compilation of necessary statistics was made and the DGIMS was in a position to state the full particulars of (a) and (b) drugs and their lists were made and sent to all concerned. It was found that drugs of category (c) were only 13 in number and as follows:—

1. Aether Anaestheticus, BP
2. Codeina
3. Digitalis Folia and preparations
4. Ferri Sulphas Exsiccatus, BP
5. Glycerinum, BP
6. Liquor Ferri Perchloridi Fortis
7. Lycopodium
8. Potassii Permagnanas (Powder)
9. Quinine Dihydrochloridum
10. Sodii Chloridum
11. Sodii Sulphas Exsiccatus
12. Potassii Permagnanas (2 grs. Salol coated pills)
13. Zinci Carbonas

In considering whether India's production of indigenous drugs would be sufficient for the reserves and maintenance of 12 divisions in addition to India's own requirements, the following factors had to be taken into consideration:—

(a) Normal peace issues to civil and military departments, the civil issues being about three times the military. The latter included 45,000 British and 2,13,000 Indian troops.

(b) Requirements due to first expansion.

(c) Raising of new units, additional requirements connected with the emergency.

(d) Approximately 12,000 hospital beds to receive casualties from overseas.

(e) Requirements of the civil population obtained direct from the trade and not through the agency of the Medical Stores Department.

As regards instruments and appliances from India, no appreciable difficulty was anticipated. They were mostly non-expendable and the requirements as compared to drugs were small. Some difficulty was felt in the beginning as mentioned earlier regarding the supply of indigenous instruments and appliances to the Middle East Command due to heavy commitments in connection with the initial equipment. Extensive enquiries were, however, addressed by the DGIMS to all the known firms in India and from the information made available it was clear that items like fine cutting instruments, hypodermic and surgical needles and optical apparatus, were not satisfactorily produced in India. Provided, adequate supplies of suitable steel and other necessary metals could be imported, and given time from six to nine months to develop the industry, it was considered possible that with the exception of optical instruments and appliances and a few fine cutting instruments such as cataract knives all the then essential demands from overseas could be met in India.

POLICY REGARDING INDIA'S COMMITMENTS OVERSEAS

The position as regards the order placed for drugs and other medical stores for the 1940 expansion and the geneal policy laid down by the War Office for the requirements of the Middle East Command Forces were explained in a communication from the War Office, London [2], a brief summary of which is given below:—

> " As much as possible of the requirements of the Middle East Command Forces were to be supplied from sources east of the Mediterranean. Only stores which could not be obtained from such sources were to be demanded from the U.K. "

The policy in building up reserves of medical equipment for forces operating in the Middle East Command and for forces based on India was as follows:—

Nine Divisions Operating in Middle East Commands

(a) *Items supplied by India:* Five months' reserves to be located in the Middle East Command and four months' maintenance to be located in India as reserves.

(b) *Items supplied from the U.K.:* Five months' reserves to be located in the Middle East Command.

Three Division Force based on India

(a) *Items supplied by India:* Nine months' reserves to be located in India.

(b) *Items supplied from the U.K.:* Five months' reserves to be located in India.

The above policy laid down by the War Office for building up reserves and maintenance for Middle East Command Forces and for forces for Middle East Command based on India was agreed to by the Financial Adviser (Military Finance) with the result that the following reserves of indigenous stores were ordered to be built up:—

(a) Nine months' reserves to be built up in India for three divisions (amounting to 27 'U').

(b) Four months' reserves to be built up in India for nine divisions (amounting to 36 'U').

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[2] War Office Telegram No. 75860, dated 9 July 1940, addressed to GHQ, Middle East and repeated to India.

(c) Five months' reserves for nine divisions to be sent from India to be finally located in Middle East Command (amounting to 45 ' U ').

It was, therefore, evident that 108 ' U ' of indigenous stores (nine months' requirements for 12 divisions) had to be built up and this meant a tremendous quantity of stores. It is noteworthy, however, that Medical Store Depots were able to collect these stores by the end of 1940.

The table regarding maintenance of reserve stocks and supply to the Middle East Command showing responsibility for indenting for the reserves and maintenance of all forces in the Middle East Command with which India was concerned is placed on page 66.

Up to September 1940, the Medical Store Depots were supplying the Middle East Command with both imported and indigenous stores, while the Far East was also being supplied by the Medical Store Depots with both these categories of stores until the fall of Singapore in February 1942. As regards, the Middle East Command, however, a definite policy was laid down by the Defence Department relating to supply of stores which was accepted by the Secretary of State for India. In September 1940, the Government of India recommended to the War Office that the stores of U.K. origin necessary for the maintenance of the planned force in the Middle East Command should be the sole responsibility of the Middle East Command. In spite of the numerous difficulties, India, however, agreed to equip according to scale the divisions to be sent to the Middle East Command from India with imported equipment. In so far as indigenous items were concerned India accepted full responsibility for supplying these stores to the Middle East Command to a limit of 12 divisions. The War Office, London, agreed to these proposals but stipulated that in the planning of ' U ' lists the divisional strength in the Middle East Command should be taken as 35,000 instead of 20,000, the basis used for planning in India.

It was also evident from a communication received in October 1940, from the DMS, Middle East, that the Middle East Command had compiled their own ' U ' list representing supplies for one division for one month and that this list differed from the 'U' list made in India; also that the Indian scale was based on the number of medical units in the force and not on the number of men. It was for this reason that doubt was raised by the Middle East Command whether the scale of medical stores drawn up by India would be adequate for the Middle East Command. The requirements of all forces dependent on India had been covered by the Indian ' U ' list on which India was actually building up supplies for the Middle East Command. The Middle East Command had made their estimates of ' U ' list upon British scale and upon actual expenditure in the Middle East Command. The Indian ' U ' list was the scale of reserves of medical stores for forces proceeding ex-India. In order to ensure that expensive preparations were not demanded by their medical units a committee was formed by the Middle East Comand and a list of preparations to be demanded for the Middle East Command forces was published.

Tabular statement showing responsibility for indenting for the reserves and maintenance of all forces in the Middle East, with which India was concerned.

Force	U.K. Stores			Indian Stores			Remarks
	Period of maintenance	Location of reserves	To be demanded by	Period of maintenance	Location of reserves	To be demanded by	
(1) 9 Divisions	5 months	Middle East	War Office or Middle East	5 months + 4 months	Middle East India	Middle East India	
(2) 'Trout' *plus* such units of 'Herring' as India was providing	5 months	India	India	9 months	India	India	In addition, India was responsible for the initial equipment for this force
(3) Balance of 'Herring' i.e., 2 Divisions	5 months	India	War Office or Middle East	9 months	India	India	

It was suggested by the DMS, Middle East Command, that the DGIMS should take steps to discover the reserves which were already being built up and check them against the actual requirements of the Middle East Command. In order to clarify matters three lists were sent from India to the Middle East Command:—

(a) Items which were in both the lists, i.e., in India's ' U ' list and in the Middle East Command ' U ' list.

(b) Items which were in India's ' U ' list but not in the Middle East Command ' U ' list.

(c) Items which were in the Middle East Command ' U ' list but not in India's ' U ' list.

The Middle East Command had drawn up their ' U ' list after very careful consideration by the consultant staff, one of the chief considerations being the availability of drugs. The Middle East Command was quite prepared to make adjustments to their then existing ' U ' list in the light of new production of drugs in India. It was suggested that India should give a list of all drugs available and becoming available for export, upon which the Middle East Command would absorb all that was useful. Monthly indents were, however, being sent by the Middle East Command for both maintenance and reserves and any deficiency which would occur due to variations in the scale was thus made up. An indent for three months' maintenance of medical stores was also prepared and sent to India for compliance by the Middle East Command in July 1940.

Following the controversy regarding the adequacy of the ' U ' list for the Middle East Command a completely revised ' U ' list was prepared by the DMS in India and forwarded to the Middle East Command in November 1940. This was approved by the Middle East Command and was brought into use later in all calculations as " Revised U List 1941 " and " Revised U-B List 1941 ".[3]

The revised Indian ' U ' list represented the average monthly requirements based on the total annual expenditure of all medical units and non-medical units with medical equipment for a force of 35,000 men. In compiling the list India had taken into account the actual demands received from depots overseas. This ' U ' list was adopted in building up reserves and maintenance stocks in India for all purposes up to March 1943. It was provided, however, that depots of medical stores overseas would continue to submit monthly indents on an " as required basis. "

In December 1940, it was made clear by the Defence Department, India, to the Middle East Command that according to the policy accepted India was not responsible for the supply of U.K. stores to troops proceeding from India to the Middle East Command and hence the Middle East Command should demand on the U.K. for all U.K. medical stores required for both reserves and maintenance for future forces proceeding from India to the Middle East Command.

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[3] See Appendix V (a) and V (b).

As regards reserves for the Middle East Command four months' indigenous stores were required to be kept in India and five months' reserves were required to be sent to the Middle East Command.

Regarding the building of maintenance and reserves for the Middle East Command in India one point which had puzzled the DGIMS was whether in fact the Middle East Command were indenting in their monthly indents only for maintenance, or whether they were building up any reserves from what was being sent to them from India. India's commitment was to find five months' reserves of indigenous stores to be sent to the Middle East Command and the position in January 1941 was that they were being built up as fast as possible. But if the Middle East Command were accummulating some of the five months' reserves out of the monthly indents it was desirable that the position should be clarified.

The specific question then put to the Middle East Command was "Did the monthly indents which the Middle East Command placed on India cover maintenance only or was the Middle East Command building up five months' reserves which India was committed to provide in respect of India's indigenous stores?" The reply received from the Middle East Command, was that the regular monthly Middle East Command indents up to February 1941, had represented amounts not only for monthly maintenance but also for building up five months' reserves for the forces. Although this meant duplication of reserves for the Middle East Command, the additional stocks came in handy in meeting the increasingly large demands of the expanding Middle East Command as although the forces planned for the Middle East Command (excluding three divisions from India) were only nine divisions, the Middle East Command were planning in February 1941, for a possible 17 divisions by June 1941, and 23 divisions by the end of 1941.

In Defence Department, India telegram No. 2705, dated 9 September 1940, referred to earlier, a promise was made that as regards the maintenance of stores of Indian origin, India was addressing the Secretary of State for India, London, separately. This referred to the maintenance of stores of Indian origin as distinct from reserves of the same to be built up for 12 divisions in the Middle East Command regarding which information had been duly furnished to the Secretary of State. Full details of capacity to supply instruments, etc., to the Middle East Command were also communicated to the Secretary of State in response to a query from the Middle East Command.

In October 1940, the policy of expansion of the Middle East Command forces underwent a radical modification and completely altered the picture regarding India's responsibility of supplying indigenous stores to the Middle East Command and it very soon became a problem of supplying for 27 divisions. The question then was whether India was to undertake responsibility not only of building up reserves and maintenance according to the policy already laid down for 12 divisions but also take up the additional responsibility of maintenance of medical stores of Indian origin for the needs of the expanded forces. The Eastern

Group Supply Council and the CPO, however, which came into existence about this time for the purpose of supplying the troops in the whole of the Eastern Group area took over the entire responsibility of provisioning not only for the Middle East Command but the Eastern theatres of the war also.

Hereafter items: Difficulties were experienced by the Medical Stores Department in dealing with " hereafter " items in the Middle East Command indents. It was the practice of Medical Store Depots in complying with indents to mark items which could not be supplied at the moment " hereafter ". ' Hereafter ' index cards were maintained at the depots. When these items became available they were automatically supplied. In most cases, however, it was impossible to say when a particular item would become available. This system involved a great deal of clerical work in the Medical Store Depots and was likely to result in confusion and duplication of demands. In complying with the Middle East Command indents the term " hereafter " was, therefore, dropped and the following remarks were added opposite the items not available " Not Available, re-indent in the next indent ".

Supply of medicinal gases: The question of providing adequate reserves of medicinal gases had been troubling the Middle East Command for sometime during the early stages of the war (1940-41) as the War Office, London, had informed the Middle East Command that they could only import a small number of cylinders while India with its limited resources was not able to cope with the Middle East Command demands for medicinal gases. The Middle East Command, however, was able to arrange refilling of empty cylinders locally, particularly Nitrous Oxide gas through the African Oxygen Company.

Equipment for Force Sybil

Initial equipment for force ' Sybil ' from India for the Middle East Command was supplied by the U.K. and complete equipment including surgical instruments and appliances was despatched by the War Office to India regardless of the indigenous production in India. It was agreed with the British Government that the Middle East Command should demand reserves of the U.K. items for the remainder of the three divisions based on India and that India was to take no steps to obtain these stores. The following medical units were authorised and supplied for ' Sybil ':—

Field Hygiene Section	1
Depot Medical Stores	1
Mobile X-ray Unit	1
Field Laboratory	1
Casualty Clearing Station	1
Anti-Malarial Units	2
Indian Staging Sections	2
British Staging Section	1
CGH (HQ one British for Indian and one Dental Section)	1
CGH (HQ one British and five Indian Sections)	1
IGH (HQ and ten Sections)	1

X-ray Unit	1
Hospital Ships	2

Action to obtain equipment for two hospital ships in connection with 'Sybil' had already been taken by India.

The above units for 'Sybil' were found from those ordered for the 1940 expansion and by "stepping" up the 'Sabine' units. All such units, therefore, required replacement and the above mentioned equipment received from the U.K. was in replacement for 'Sybil'.

Medical Units—'Sabine'

In addition to the medical units referred to under 'Sybil' above the following units were authorised and supplied for 'Sabine':—

Depot Medical Stores	1
Indian Convalescent Depot	1
Casualty Clearing Station	1
Indian Staging Sections	2
Indian General Hospitals:—	
Headquarters	2
Sections	8

In May 1941, the DMS, Middle East Command, was informed that India had collected reserves of 108 'U' at the call of the Middle East Command practically complete in all items, although monthly demands from the Middle East Command covered reserves as well as maintenance. These monthly demands continued to come through the DMS in India till November 1941. The CPO was actually opened in April 1941, but had started functioning properly only by about November 1941, when the Middle East Command demands began coming through the CPO and not through the DMS.

As regards the policy for medical supplies overseas the following extract from a note dated 15 July 1940, by the DMS is of interest:—

> "1. When troops were not going overseas, the reserves calculated for overseas need not be considered.
>
> "2. It was clear that these requirements should not be demanded forthwith, but an estimated forward time-table prepared showing approximate dates units would be ready in India, and next estimated dates of units going overseas.
>
> "3. The DGIMS was responsible for the stores and calculated his available resources in terms of 'U'.
>
> (a) those actually in stores.
> (b) those in India and potentially available.
>
> "4. I consider U.K. should be informed of our calculations and be prepared to send out the reserves of U.K. Stores shown according to a definite forward time-table.
>
> "5. In addition to the reserves shown we must not forget that preparations must be in hand to replace the monthly expenditure of the whole force, again on an estimated forward time-table.
>
> "In the first instance, this could be done in terms of 'U' but for the forces overseas and in India the demand would be on monthly and

supplementary indents to replace what had actually been consumed. We should make no changes in our ' U ' list until practical experience for a year gives us a very clear indication, as obviously certain kinds of drugs are used in greater quantities some months than others, e.g., Quinine in the Malaria season.

" 6. It was advisable to cater for sinkings of our freight ships; for this reason I request a 10 per cent. reserve in addition to all our calculations, and further that our stocks sent abroad be distributed over several ships.

" 7. To save U.K. stores a substitute list had been prepared showing Indian drugs that could be used wholly or in part. Medical units in India and overseas must start using these substitute lists from the beginning ".

FAR EAST

In the case of the Far East six months' reserves of indigenous stores and twelve months' reserves of imported stores were built up according to the policy laid down. It was, however, not made clear at any time whether the whole or only a part of these were to be despatched to the Far East and whether or not a part would be kept in India. This question was never definitely answered and in practice both imported and indigenous stores were despatched as and when demanded by the Far East. The monthly indents from the Far East also included both indigenous and imported items. Later with the fall of Singapore on 17 February 1942, the question of sending medical stores to the Far East ceased to exist. In fact, the last series of 12 CPO issue orders for supply of medical stores to the Far East were received by the DGIMS in January 1942, and were complied with in full by the Medical Store Depot, Calcutta, after which date no demands were received from the Far East. The balance of military medical stores collected for the Far East which remained in the depots of the DGIMS after the fall of Singapore were handed over to the DMS (Medical Directorate) and the Central Provision Office in certain proportions.

In the case of supplies to the Far East the store margin including working stocks of twelve months' reserve of imported stores and six months' of indigenous stores which had been authorised and built up, was hepful in meeting the following emergencies connected with the Far East War:—

(1) Losses due to sinking of ships. Although detailed records of such losses were not always available, the Medical Store Depots were able to cope with the additional demands due to such losses.

(2) Unforeseen demands due to extensive air raids in the Far East.

COMPLAINTS REGARDING OVERSEAS SUPPLIES

It is noteworthy that throughout the period of the war, although minor complaints regarding supplies from India were received from the Middle East Command and the Far East, no complaint was received at any time regarding deficiency of stocks. In fact, in spite of the various difficulties that India had to contend with regarding production and collection of the required quantities of indigenous stores for maintenance and reserves overseas, no instance was reported of any breakdown in supplies. As regards the quality of the indigenous stores, however, supplied from India, it was reported to the DMS in the early stages of the war before the Inspection Directorate came into existence that their quality was not as good as that of the imported stores received from the U.K. No specific complaints are, however, on record. The following were some of the complaints received from the Middle East Command in the matter of medical stores supplied from India:—

1. During 1940-41 several complaints were received from the Middle East Command regarding the poor quality of the packing cases from India in which stores were packed. Breakages and losses of stores had occurred due to manipulations in transit and loading and unloading at various centres. This was overcome by the introduction of the ' utility ' packing case in 1942 which was devised for shipments by the DADG, Medical Store Depot, Lahore Cantonment. This was a particularly strong packing case with strong rope handles to facilitate its manual transport the top being closed with a lid, which could be screwed on. Experience proved that this ' utility ' packing case which was used in complying with all indents for overseas requirements from 1942 onwards had stood the journey overseas, loading and unloading from ships and other rough handling in transit. This ' utility ' packing case was used to pack all stores required in connection with the CPO issue orders during the war.

2. It was reported from the Middle East Command in February 1941, that No. 10 Indian General Hospital was sent out without X-ray, gas and oxygen apparatus, Steinman pins, Kirschner wires or extension apparatus, all of which had to be supplied from British stocks in Egypt, as they were considered necessary. It was suggested that they should always be supplied.

3. Large stocks of antimeningococcal serum were sent. It was suggested that this drug was not required anyway in large quantities.

4. Much of the adhesive plaster supplied from India was unsatisfactory as it did not stick properly. It was possible that direct supply from the makers of this very perishable item would have helped matters.

5. The gauze cloth supplied for plaster of Paris bandages was not liked by many surgeons in the Middle East Command who asked for better materials.

6. Plaster of Paris was sent in one-lb. unsealed tins which did not survive the journey to forward areas and had to be thrown away. It was suggested that 7-lb. sealed tins would be best, the lids, of course, being such as could be fitted back again fairly tightly, if all the contents were not used up at once.

7. Some of the drugs sent out as reserve stocks were not of much use as they soon became time-expired according to the labels on them.

8. Drugs that used to be supplied in tablet form were sent as powders and the units which had to use them had no dispensing scales; for instance, acriflavine used to go out in tablets to make a known amount of solution of known strength. It was supplied in one-oz. bottles and inaccuracy and/or waste occurred in using it in establishments where no scales were available as in a MDS.

9. Novacaine in 1-cc ampoules was inconvenient when required for use as a local anaesthetic for amputations, etc. It was more convenient to have 100 cc rubber capped bottles.

10. All metal syringes were a frequent cause of complaint. Most medical officers asked for record pattern, preferably of some boilable pattern glass like pyrex. They were needed in great numbers and with many more needles, especially as air dispersal made it so very inconvenient to have to go and fetch from one shelter to another.

11. Morphia in solution was badly needed. It was often said that it was difficult to find a spoon, lamp and water and dissolve tablets quickly. It would be more convenient if morphia was supplied in rubber capped bottles of 20 or 25 cc.

12. It would have been better if the retractors supplied to forward units were small ones and not with blades 5″×2″ with 10½″ handles, as it was found that few abdominal cases were coming in, while the wounds of the lower limbs and back, for which small retractors were necessary, were very common due to land mines, hand grenades and light bombs.

13. Psychologically at least a supply of tonic pills in forward medical units would be of great value.

14. An increase in the scale of issue of spirit lamps was suggested as owing to the distances between tents and/or shelters, each part of a medical unit had to be more or less independent. It was quite easy in a sand storm to spend 5 minutes getting from one shelter to another in an MDS.

15. Fine silk worm gut was not proving popular and the thick or at least medium would be better.

16. An amputation knife in forward medical units would save time in lopping macerated limbs (and also avoid the less experienced surgeons causing bruising of tissue). These amputation knives were of special importance in air raids.

17. Rubber aprons of the type used in hospitals would be better than the coat with sleeves and back which were being used, which required much more material and took up more space when packed for moving.

18. Operation towels 42″×34″ were so big that only a few could be sterilised at a time. This was all right in quiet days, but when a rush of cases came one wanted many towels. Something about 24″×24″ size was suggested for forward units.

19. In Western Desert, it was considered dangerous to use ether as an anaesthetic in the presence of oil lamps and that was why chloroform was required for forward medical units. Ether anaesthesia could, however, be used in operations if Petromax and Hurricane lanterns were used with care. It was easy for the non-expert to kill with chloroform and so difficult with ether. Chloroform was contra-indicated in cases of shock, anaemia and where adrenalin was used with a local anaesthetic. It was the suggestion of many surgeons in the Middle East Command that ether should be supplied in forward medical units.

20. The shipway apparatus supplied to one CCS did not include the special mask without which the utility of the apparatus was very much reduced. It was suggested that masks should always be sent with the apparatus.

21. Bleaching-powder was being sent in tins of inconveniently large size and wastage of 20 per cent. was reported. The 4-oz. size as supplied by the British Army was suggested.

22. No. 0 catgut was probably desirable where abdominal or cerebral surgery had to be done as No. 1 was a little too thick.

EASTERN GROUP SUPPLY COUNCIL AND THE CENTRAL PROVISION OFFICE

With the object of recommending to the British Government steps for the better co-ordination of the supply of stores to forces operating and located in Africa (including West Africa), Palestine, Iraq, India, Burma, Malaya, Hong Kong, Australia, New Zealand, etc., a conference of the representatives of the Dominions and the Eastern Group countries was convened at New Delhi in October 1940 at the invitation of the Viceroy of India.

The object of the conference was to consider how best the resources of the Eastern Group countries could be marshalled and organised to secure the maximum production of war supplies for the armed forces serving in the Eastern Group area. It became apparent during the conference that the existing and potential capacity of these Eastern Group countries could provide substantial contribution towards meeting the requirements of these forces. In order, however, to ensure that the Eastern Group capacity was fully utilised, it was considered necessary to establish a permanent organisation to co-ordinate and centralise the requirements and production of the several constituent members of the Group.

As a result of the recommendations of this conference which were accepted in principle by the British Government and the Dominions concerned, the following measures were adopted:—

(1) A Representative Supply Council (Eastern Group Supply Council) was set up to place orders for and to co-ordinate the supply of *warlike stores* in the Eastern Group countries.

(2) A Military Central Provision Office (which served as a military counter-part of the Eastern Group Supply Council, the latter being a civil organisation) was set up to provide the Eastern Group Supply Council with data for supply action and to receive and satisfy maintenance demands presented by the local provision offices established by military commands in the Eastern Group countries and the Eastern theatres of war.

The above recommendations of the Eastern Group Conference which were accepted in principle by the British Government were subsequently extended to include operations in the Balkans and the probable needs of the Allies in that theatre.

As a result of the inauguration of the Eastern Group Supply Conference and the establishment of the Eastern Group Supply Council and the Central Provision Office, India came to be the centre of supplying countries.

The main object in holding the conference to ensure that for the purpose of supplying troops in the whole of the Eastern Group Area, the Group should, as far as possible, draw its war supplies from its own industrial capacity and the Council was formed to facilitate the carrying out of this policy.

India was thus called upon to contribute up to her maximum capacity in the production of war material for the Eastern Group Supply Council. According to the decision of the Council there were to be no limits of industrial activity in India. On the contrary, production in India was to be stimulated as in other countries of the group to meet the needs of the troops. India had great strategical and geographical advantages and for this reason it was decided that the Council should be located in India.

Although the U.K. and the manufacturing firms in India provided practically all of India's requirements between them, certain items of medical stores had to be obtained, as the war progressed, from two other sources, namely, the U.S.A. and the Eastern Group Supply Organisation. Demands for items which were in short supply in the U.K. were diverted to the U.S.A. provided the quantities so diverted were justified. Such items were usually transferred to India from the Lease/Lend account. The Eastern Group Supply Organisation was responsible for diverting all goods manufactured in the various countries within the Eastern Group, which were surplus to their requirements. In the case of medical stores, the chief supplying country was India and hence the number of demands placed by the local provision offices (in India) on the remaining countries was small. This source had, however, to be tapped before placing demands either on the U.K. or the U.S.A. in order to reduce shipping commitments.

Working of the Council: The military member of the Council, who was the representative of the Army Council and the Imperial General Staff was designated officially as the Controller General, Army Provision (EG). He presented the needs of the armed forces in the Eastern Group which could not be met locally and which had to be met through the machinery of the Central Provision Offices which were set up under the control of the military member; that is to say, the requirements of the troops in India were to be handled by the Eastern Group Supply Council only if the Government of India could not supply them from within India.

In the light of the information derived from the countries in the Eastern Group and of the military situation the Council could decide from what country or countries it would be best to obtain supplies and would ask the Governments of those countries to place the necessary contracts. The Council was not to place orders direct with manufacturers.

Working of the CPO: The demands from all military authorities within the Eastern Group Area for stores for the forces for which they were responsible which they could not obtain locally but which could be provided from other countries of the Eastern Group were co-ordinated by the CPO and submitted to the Eastern Group Supply Council.

The CPO was a military organisation and worked in collaboration with the Eastern Group Supply Council. The requirements of the CPO were to be in the form of:—

(a) firm demands to meet the actual immediate needs and
(b) long-range forecasts to enable future supplies to be planned.

The Local Provision Office: It was a part of the Army Staff within each military command. The CPO mainly dealt with these local organisations or Local Provision Offices.

An important function of the CPO was to determine the priority of allocation of the available supplies to the military commands, should shortages arise in particular stores or commodities. In all such matters, however, the Controller General, Army Provision (E G) was guided by the policy of the General Staff in London.

Eastern Group Conference Report on Medical Stores: The Report by No. 3 Sub-Committee of No. 2 (General Stores) Committee of the Eastern Group Conference on medical stores which investigated the position of supply of essential medical stores of the categories mentioned below from the various Eastern Group countries is given in Appendix VI.

FUNCTIONS, ORGANISATION AND SCOPE OF THE CENTRAL PROVISION OFFICE

The functions of the CPO were as follows:—

A.—To receive from local provision offices forecasts, or to estimate long-term forecasts of quantities of all stores in votes 3F (Medical), 7, 8, 9 (Ordnance) and 10 (Engineering stores) required—

(i) to equip and maintain forces raised in the Eastern Group countries.
(ii) to maintain forces operating in the Eastern theatres.
(iii) to meet, as far as possible, the needs of Allies operating in the Eastern theatres.
(iv) to meet demands for such common user stores as may be placed by Naval and Air Force Commands in the Eastern Group..
(v) to meet any additional demands which may be placed from time to time by the British Government.

B.—To co-ordinate and when necessary adjust forecasts and place firm demands on the Council for supply, such demands being accompanied by information as to the desirable dates of delivery and final destinations.

C.—To keep up-to-date records of stocks and dues.

D.—To furnish the Council with monthly forecasts of the shipping tonnage each Eastern Group country may be called upon to find two months ahead.

E.—To receive monthly maintenance, supplementary and special demands from local provision offices.

F.—In cases of short supply to decide under the general directions of the CIGS questions of priority of issue.

G.—Based on (E) and (F) above to place issue orders for the most expeditious supply and initiate where necessary, additional provision action through the Council.

H.—To receive from local provision offices in theatres of operations information regarding productive capacity surplus to the local needs and transmit it to the Council.

ORGANISATION OF PROVISION AND SUPPLY IN THE EASTERN GROUP

The relation between the Eastern Group Provision and Supply participating bodies and their contacts with the British Government are shown diagrammatically below:—

Diagram of relationship between Provision and Supply Bodies

United Kingdom	Supply Ministry	War Office
Delhi	EG Supply Council	Central Provision Office
Eastern Group Countries and Theatres of	Supply Depots	Local Provision Offices

ORGANISATION OF THE CENTRAL PROVISION OFFICE

The organisation of the CPO is shown diagrammatically on page 78.

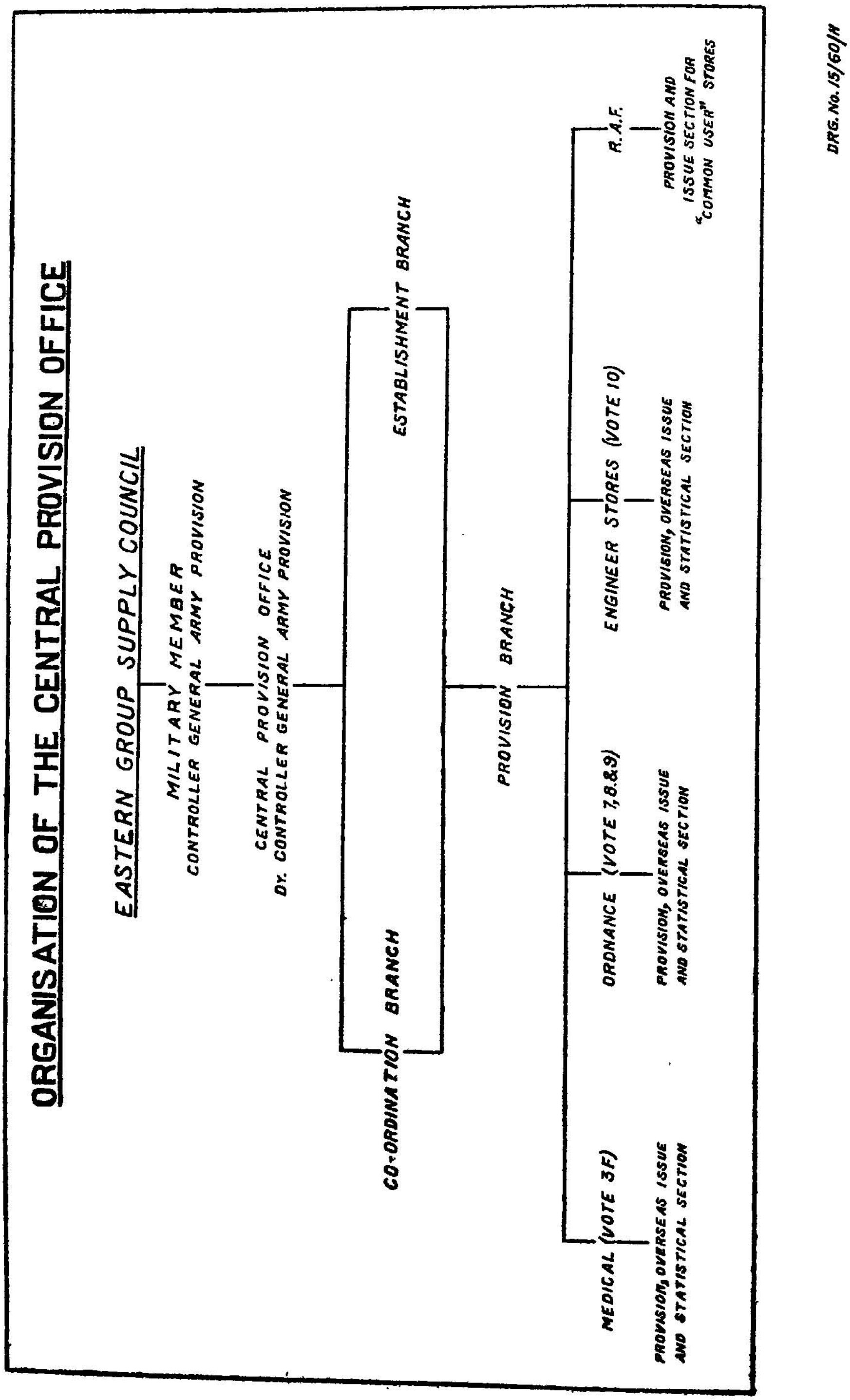
SCOPE OF PROVISION

(a) The Eastern Group Provision and Supply action was limited to the stores included in Votes 3F (Medical), 7, 8,9 (Ordnance) and 10 (Engineering Stores) with the exception that certain items of stores (which were only to be obtained from the U.K. and known as the " Special List ") were demanded separately by the local provision officers on the War Office, copies of all demands being sent to the CPO for information. The co-ordination of provision and supply action in respect of such stores was specifically vested in the War Office and the Ministry of Supply.

(b) With regard to items, other than those in the " Special List " not produced in the Eastern Group countries the local provision offices had to notify requirements to, and place demands on, the War Office, copies of forecasted requirements and demands being sent to the CPO. A complete list of such items was eventually compiled by the Eastern Group Supply Council.

(c) Stores known by the local provision offices to be produced in the Eastern Group countries in quantities insufficient to fill their total requirements were treated as follows:—

(i) In cases where it was known by local provision offices that the Eastern Group countries produced less than 50 per cent. long-term forecasts of requirements of these items were passed to the War Office, copies being sent to the CPO. The CPO then passed the forecasts to the Supply Council who notified the War Office through the CPO of the quantities for which supply could be arranged for Eastern Group countries. The War Office then notified the Council through the CPO of the



ORGANISATION OF THE CENTRAL PROVISION OFFICE

EASTERN GROUP SUPPLY COUNCIL
MILITARY MEMBER
CONTROLLER GENERAL ARMY PROVISION
CENTRAL PROVISION OFFICE
DY. CONTROLLER GENERAL ARMY PROVISION
CO-ORDINATION BRANCH
ESTABLISHMENT BRANCH
PROVISION BRANCH
MEDICAL (VOTE 3F)
PROVISION, OVERSEAS ISSUE AND STATISTICAL SECTION
ORDNANCE (VOTE 7,8,&9)
PROVISION, OVERSEAS ISSUE AND STATISTICAL SECTION
ENGINEER STORES (VOTE 10)
PROVISION, OVERSEAS ISSUE AND STATISTICAL SECTION
R.A.F.
PROVISION AND ISSUE SECTION FOR "COMMON USER" STORES
DRG. No. 15/60/H

proportion of each requirement to be met by the Eastern Group. The CPO subsequently informed the local provision offices of the proportions of their requirements which would be met respectively by the War Office and the CPO. Monthly demands were then submitted accordingly.

(ii) In cases where it was known by local provision offices that Eastern Group countries could produce 50 per cent. and over long-term forecasts of requirements were passed to the CPO. The latter then ascertained from the Supply Council what proportion of each requirement would be forthcoming from the Eastern Group and then notified the War Office of the balance to be supplied from other sources and subsequently instructed the local provision offices to place their monthly demands accordingly. As regards " Special List " items, long-term forecasts of requirements for Commonwealth forces were not needed by either the War Office or the CPO.

STOCKS

All branches of the CPO had to obtain complete information of the stocks held on their behalf by the supplying countries in the Eastern Group, stock records being kept up-to-date by means of monthly stock returns obtained by CPO Co-ordination Branch.

DELIVERY FORECASTS AND PROGRESS REPORTS

(a) Delivery forecasts had to be obtained by the CPO (co-ordinating branch) from the supply council and were distributed to provision branches for record, future planning and where necessary, communication to local provision offices in theatres of war.

(b) Monthly progress reports of items actually produced and accepted in satisfaction of orders were also obtained by the CPO (co-ordination branch) and distributed to provision branches for stock, record and issue purposes.

Forecasts of Shipping Requirements: Provision branches had to furnish to the co-ordinating branch by the first of each month an estimate of the shipping tonnage with probable destinations required for the monthly period commencing two months ahead. The co-ordinating branch collated the estimates and passed the information to the Supply Council for transmission to supplier countries by cable.

Responsibility for Delivery

Responsibility for obtaining tonnage, loading and despatch rested entirely with supplier country. The CPO orders were accompanied by all necessary despatch instructions, including destination port and consignee for each group consignment.

RELATIONS BETWEEN THE CPO EASTERN GROUP AND LOCAL PROVISION OFFICES

Local Provision Offices: By agreement between the British Government and the participating countries of the Eastern Group, the following local provision offices were established and were ready to operate by 1 July 1941:—

L.P.O.	*Code reference*	*Area of responsibility*
Middle East	M.E.	Egypt, Palestine, the Sudan, North Rhodesia, Kenya, Uganda, Tanganyika, Nyasaland and Aden
India	H.N.	India, Ceylon and Iraq
Far East	F.E.	Burma, Malaya and Hong Kong
Australia	A.U.	Australia
New Zealand	N.Z.	New Zealand
South Africa	S.A.	South Africa
South Rhodesia	R.H.	South Rhodesia

Organisation of the Local Provision Offices: Although the organisation of each local provision office was entirely a matter for decision by the local military command, it was found convenient to follow as far as possible the organisation of the CPO.

Duties of the Local Provision Offices: (a) To make every effort to meet by local provision through their own supply organisations and by local purchase all requirements of the forces raised and/or maintained in their own areas. Quarterly reports were rendered by local provision offices on the first day of July and October, January and April to the CPO indicating in general term the extent to which the local provision had been possible. Local provision offices in theatres of operations were to report monthly to CPO the extent of any surplus capacity for military stores in their own areas. Reports were to reach the CPO by the 15th of each month. (b) To furnish to the CPO:—

(i) By the first of July and first of January each year, forecasts of quantities of all stores in *Votes 3F. 7, 8, 9 and 10* (excluding those which could be provided locally). The CPO was also to receive from each local provision office the forecasts of stores which could not be provided locally.

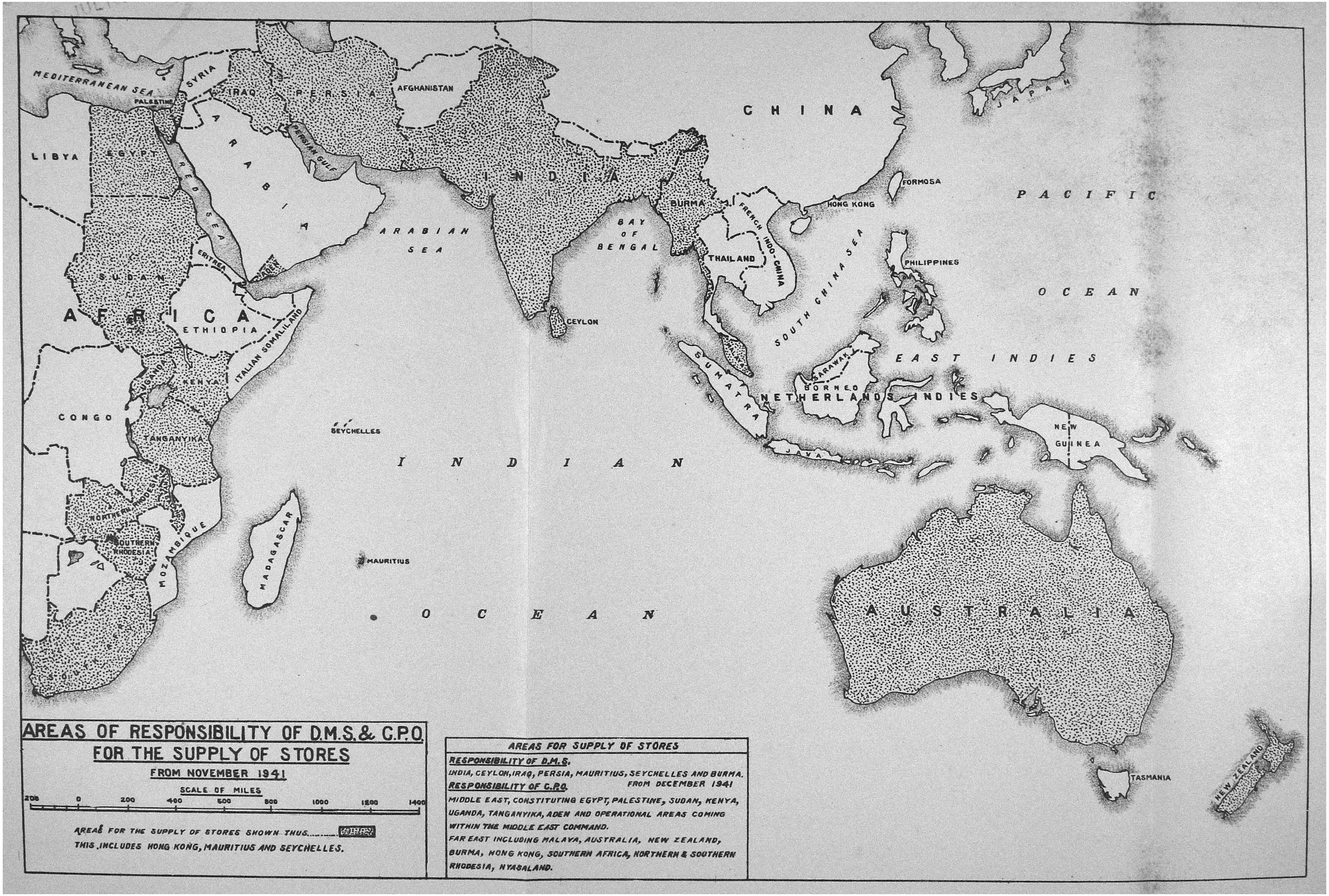
(ii) Monthly indents by the first of each month for maintenance and reserves.

(iii) By the 15th of each month, monthly records of stocks held in military establishments on behalf of the CPO. This information was not required from local provision offices located in theatres of operations.

(iv) Periodical intelligence reports from local provision offices in theatres of operations on commercial and industrial developments in their own areas which would be of interest to the Supply Council from a production point of view; also comments by users concerning the suitability of stores which had already been provided.

(v) Reports by cable notifying the receipts of each complete and/or part shipload of demanded stores.

Procedure regarding Issue of Stores: On receipt from local provision offices of monthly indents, the CPO arranged for the necessary issue of stores by placing issue orders on the most convenient stockholder. Once an issue order had been placed by the CPO the responsibility for despatch and notification to the indentor local provision



AREAS OF RESPONSIBILITY OF D.M.S. & C.P.O. FOR THE SUPPLY OF STORES

FROM NOVEMBER 1941

SCALE OF MILES

AREAS FOR THE SUPPLY OF STORES SHOWN THUS.......... ▨
THIS INCLUDES HONG KONG, MAURITIUS AND SEYCHELLES.

AREAS FOR SUPPLY OF STORES

RESPONSIBILITY OF D.M.S.

INDIA, CEYLON, IRAQ, PERSIA, MAURITIUS, SEYCHELLES AND BURMA.
FROM DECEMBER 1941

RESPONSIBILITY OF C.P.O.

MIDDLE EAST, CONSTITUTING EGYPT, PALESTINE, SUDAN, KENYA, UGANDA, TANGANYIKA, ADEN AND OPERATIONAL AREAS COMING WITHIN THE MIDDLE EAST COMMAND.

FAR EAST INCLUDING MALAYA, AUSTRALIA, NEW ZEALAND, BURMA, HONG KONG, SOUTHERN AFRICA, NORTHERN & SOUTHERN RHODESIA, NYASALAND.

office, of all the details of consignment and despatch rested with the stock-holder. Thereafter the indentor local provision office and stock-holder communicated direct with one another concerning each particular transaction, informing the CPO of any important points affecting the transaction, e.g., delays, changes of destination, losses and priority of despatch when shipping was limited.

Liaison and Communications: Local purchase by local provision offices was governed by the following principles:—

(a) Purchases were made as far as possible in such a manner that the existing channels of supply within the local provision office areas were not disturbed more than could be justified by military expediency.

(b) In the case of the Middle and Far East any difficulties whether on political or other grounds in placing an order on more than one country within the group would be referred to the Supply Council through the CPO.

Long Term Provisioning: Long-term forecasts were the responsibility of the local provision offices. In broad terms, the idea was that long-term orders once placed should not be altered until renewal forecast orders were placed.

TRANSFER OF RESPONSIBILTY FOR PROVISION OF MEDICAL STORES FOR EASTERN GROUP THEATRES OF WAR FROM THE DMS IN INDIA TO THE MEDICAL BRANCH, CENTRAL PROVISION OFFICE

The Medical Branch CPO was organised in July 1941 with the object of taking over from the DMS the responsibility for provision action to meet the demands of forces in the Middle and Far East and also to provide for the needs of countries in the Eastern Group which could not be met from local resources.

The DMS was to provide the following information:—

(i) The data on which provision action for the Middle and Far East had been taken.

(ii) The procedure in force for calculating requirements and making forward provision programme.

(iii) The scope, in detail, of the provision already made by India for the Middle and Far East.

The DGIMS was to provide:—

(i) a list of medical stores not obtainable in India.

(ii) a list showing the proportion of the total stocks and dues held in store depots for military purposes.

CPO Responsibility

Actual transfer took place in October 1941. Thereafter the DMS's responsibility was to be confined to provision for:—

(a) India's own internal forces.

(b) Any forces raised for overseas with their reserves.

(c) Maintenance and reserves of any overseas forces for which India was responsible.

Method of Adjustment of Assets and Liabilities: The DMS on behalf of India and the Assistant Director of Medical Services, CPO on behalf of the Middle and Far East were to carry out parallel reviews of the total requirements up to 31 March 1942 based on the latest information available. The gross assets (stocks and dues) accruing from provision already made covering the period up to 31 March 1942 were to be divided approximately in proportion to the relative needs of the two provision authorities after making due allowances for any issues made by India to the Middle and Far East on behalf of the CPO between the date of the review and the date of taking over responsibility by the CPO. The proportional factor decided on was to be communicated to the DGIMS.

The ADMS, CPO was to cover by fresh provision any deficiency revealed when the sum of the parallel reviews of requirements had been offset against the total provision already made by India. Where the Medical Directorate shared the deficiency a proportionate division of the new supplies was to be arranged when received.

All dues were to be divided between the Medical Directorate and the CPO in proportion agreed as they materialised and the DGIMS was to notify the CPO of each addition to stock.

Store-holding, Receipts and Issues on behalf of the CPO: This was a responsibility of the DGIMS which continued as such throughout the war. In this connection, the DGIMS agreed to the following when stocks were split:—

(a) To provide storage, as required for stocks accumulating against orders already placed by India for the Middle East and Far East and future orders to be placed by CPO.
(b) To provide after reasonable notice additional storage facilities, and staff.
(c) To maintain the necessary staff to handle the CPO stocks in and out of stores.
(d) To keep ledger accounts for the CPO stores held in Indian Store houses.
(e) To receive and issue stores as requested by the CPO.
(f) To furnish the CPO with a copy of each receipt and issue voucher.
(g) To furnish the CPO with the stock position of all items on first receipt or issue voucher sent out by Medical Store Depots each month.
(h) To carry out percentage check of items when considered necessary by the CPO.
(i) To provide special information concerning any indigenous item difficult to obtain or of which there may be an anticipated shortage.

CENTRAL PROVISION OFFICE (MEDICAL BRANCH), EASTERN GROUP CONFERENCE NO. 1 (SEPTEMBER 1941)

In August 1941, the CPO cabled HQ Middle East Forces, Cairo, that in view of the necessity of making full use of the medical reserves in India the Eastern Group Council considered it essential to get an agreement on suitable 'U' list common to all and based on possibilities of supply. In response to this, a representative was sent to India with full authority to discuss and decide on the list to be adopted as the basis of future provision.

A conference was held at Simla, consisting of the representatives of India, Middle East, Far East, Burma and Australia from 23 to 30 September 1941, to discuss various points connected with the supply, standardisation of medical stores and the desire for a common yard-stick to measure the requirements of the various forces.

The agenda and the conclusions arrived at and the actions taken were:

(1) To consider the adoption of a standard vocabulary of medical stores based on the new Indian vocabulary. In this connection, a sub-committee consisting of the representatives of the Middle East, the Far East and Burma, the Director of Production (Drugs and Dressings) and the ADMS, CPO was constituted to review the whole question in detail. The conclusions of this sub-committee were briefly to the effect that items contained in the Middle East Command list of medical stores with suggested substitutes which were indigenous as well as items contained in the Middle East Command list which were not in the new Indian vocabulary but which were indigenous to India and could be produced in the form required would be accepted and included in the new Indian vocabulary; also that items included in 'U-B' list which did not occur in the new Indian vocabulary, but which India would produce in future would be included in the new Indian vocabulary. The CPO medical branch took necessary action to amend the EG list and inform all concerned.

(2) To consider the best method of utilising stocks of medical stores which were not included in the new Indian vocabulary, but were held in the Medical Store Depots. It was decided that the ADMS, CPO should be given the latitude to supply substitutes.

(3) To discuss the position regarding reserves of medical stores held in India and in the various theatres of war.

It was decided that the CPO should build up six months' stocks based on the initial forecasts of all countries.

(4) To consider the question of field medical equipment.

It was agreed that all items on the present scale of Indian medical equipment should be held complete for immediate requirements. Action was taken accordingly by the CPO to add all items of field medical equipment not in the new vocabulary to the Eastern Group list.

(5) To discuss the definition of the word " military " in relation to Defence requirements of stores.

Burma had raised the question as to why the following categories of stores should not be considered as military and supplied by the CPO:—

(i) Essential stores for civil hospitals
(ii) ARP stores
(iii) Stores for Burma-China railway project

(6) To discuss indenting of certain items available in large quantities in India for which indents were being placed on the United Kingdom. These items were cotton, wool, shell dressings etc. It was agreed by the

representatives of all countries present that all items indigenous to India would be demanded through the CPO in future.

(7) To consider the supply of gases and cylinders. Because of the world shortage of gas cylinders it was necessary to economise. It was decided that each country should investigate its local supply of cylinders and gases.

(8) To discuss the existing sources of supply of vaccines and sera.

The Director, Central Research Institute, Kasauli, stated that it had previously been laid down that the Middle East Command would not require cholera and TAB vaccines from India, but that India would probably be able to meet the demands for these two vaccines. The requirements of the Middle East Command of cholera vaccine were estimated to be 5,00,000 cc for nine months from April 1942. The requirements of Malaya of cholera vaccine were 50,000 doses immediately as reserve stock plus replacement demand of approximately 10,000 cc per month. As regards TAB vaccine the definite demand of the Middle East Command was 7,50,000 cc for nine months from April 1942; required in monthly instalments. The requirements of Malaya were 60,000 cc as a first reserve plus further supplies of 10,000 cc monthly. It was agreed that Burma could meet her own requirements of TAB vaccine. All the demands of the army in India of TAB vaccine could be met by the CRI Kasauli.

The Haffkine Institute, Bombay, was capable of expanding production to meet any likely requirements from Iraq and Burma. Malaya had reserve stocks in the country.

Anti-rabic Vaccine and Calf Lymph: These were locally available in all countries concerned.

Diptheria Antitoxin: Central Research Institute, Kasauli, could meet a proportion of the likely demand.

Other sera and vaccines discussed were *tetanus antitoxin, gas gangrene serum*—both prophylatic and therapeutic, *anti-anthrax serum, anti-dysenteric serum, anti-meningococcus* and *anti-streptococcus sera* and *tetanus toxiod.*

The acceptance of *tetanus toxoid* manufactured in India was not recommended at this stage owing to technical factors involved in the safe and efficient production of toxoid.

The Central Provision Office estimated requirements for the Middle East Command and the Eastern Group countries for Indian indigenous items and placed demand on the DGIMS who manufactured or purchased the stores and held them in this Medical Store Depots at the disposal of the CPO. The procurement of stores for CPO was transferred to Supply Department along with these for civil and military on 1 July 1943. The demands for imported items were placed direct on the United Kingdom by the Central Provision Office and sent direct from the United Kingdom to the Eastern Group countries concerned; but later on the DGIMS also assisted by storing such U.K. items in Medical Store Depots until they were required when supplies to the Eastern Group countries including the Middle East and the Far East were made against CPO issue orders.

DIVISION OF MILITARY STOCKS INTO DMS (LPO) AND CPO AND QUESTION OF ACCOMMODATION FOR THE STOCKS OF DMS, CPO AND CIVIL

A scheme for the division of stocks in Medical Store Depots into civil and military (the latter again being divided further into LPO and CPO in November 1941) so as to facilitate central provisioning for the military and Eastern Group Supply Council was introduced in July 1941. Hence three different categories of stocks physically separated and accounted for on different coloured stock (ledger) cards were eventually transferred to DMS's own depots (Army Medical Stores). This transfer continued for months together and was completed by the beginning of 1943; while the DGIMS's depots still continued to hold throughout the war two distinct types of stores, civil and military.

On 13 November 1941, a conference of representatives of the DMS, the DGIMS, the Central Provision Office and the Military Finance Department took important decisions regarding the division of military stocks into DMS (LPO) and CPO and the question of accommodation for the three categories of stocks, namely, DMS (LPO), CPO and Civil. As regards accommodation, the then total requirements of the DMS were calculated to be 3,31,000 sq. ft. The CPO were allowed 1,50,000 sq. ft. of accommodation as follows:—

	40,000 sq. ft. at Bombay
	30,000 sq. ft. at Calcutta
	80,000 sq. ft. at Raipur
Total	1,50,000 sq. ft

CPO stocks were located in the first instance in the depots at Bombay, Calcutta, Karachi and Lahore Cantonment. After the fall of Singapore, the CPO stores located at the Calcutta Depot were all transferred to the Central Reserve Depot at Raipur. Similarly when Karachi Depot was taken over by the DMS towards the end of 1941, the CPO stocks located in that depot were transferred to Lahore Cantonment and Bombay. The Central Reserve Depot at Raipur was expanded to the extent of 1,60,000 sq.ft. to accommodate the increased volume of stores. This expansion was completed in August 1943.

The responsibility for provisioning military medical stores was divided between the DMS and the CPO as follows in November 1941:—

I. The DMS was responsible for the supply of stores to the following countries:—

1. India
2. Ceylon
3. Iraq
4. Persia
5. Mauritius
6. Seychelles
7. Burma from December 1941

II. The Central Provision Office was responsible for the supply of stores to :—

1. The Middle East, constituting Egypt, Palestine, the Sudan, Kenya, Uganda, Tanganyika, Aden and Operational

Areas coming within the Middle East Command

2. Far East including Malaya
3. Australia
4. New Zealand
5. Burma
6. Hong Kong
7. South Africa
8. North and South Rhodesia
9. Nyasaland

Certain CPO reserves of the U.K. stores known as the 1st, 2nd, 3rd and 4th CPO reserves were sent to India by the War Office and were kept in Medical Store Depot, Bombay. These were received mostly in 1942 and early 1943.

Supplies to Iraq

When Karachi Depot started functioning as an issue depot on 1 September 1941, an overseas section was started here to supply stores to Iraq.

Indent on Java for Quinine

In December 1941, an indent for the supply of 130 tons of quinine was placed on Java. This indent covered the requirements of civil, army and the CPO.

Although information was received that all this quinine was shipped from Java, only about 16½ tons (36,000 lb.) were ultimately received in India as most of the ships on which the quinine was loaded, never reached India. In March 1942, the military stocks of quinine and quinine preparations were transferred to army store depots.

PRISONERS OF WAR EXCHANGE (RELIEF SUPPLIES)

In May 1943, the British Red Cross Society and Order of St. John accepted the invitation of the Imperial Prisoners of War Committee and asked the Indian Red Cross Society to undertake local arrangements on their behalf and at their expense for the supply of essential medicines and concentrated foods to prisoners of war.

The Secretary of State for India sent to the Government of India a list of medical supplies or their suitable substitutes to the extent of six months' requirements of priosners of war in the Far East to be sent on Japanese ships with an assurance that the British Ministry of Supply would replace them immediately from the United Kingdom.

The cost of the replacements was to be met by the British Red Cross. In order to make this supply, the CPO, the Medical Directorate and civil stocks were tapped and Medical Store Depot, Bombay, was entrusted with the task of assembling, packing, marking and despatching these stores.

The areas to be served were (1) Singapore, (2) East Indies, (3) Philippines, (4) Hong Kong, (5) Shanghai, (6) Japan and all supplies were required to be marked " Red Cross Relief Supplies for War Prisoners and Internees. " Cases were to be addressed as follows:-

(i) *For Japan* to International Red Cross Delegation, Tokyo
(ii) *For Shanghai* to Eagle International Red Cross Delegate
(iii) *For Hong Kong* to Zindal International Red Cross Delegate
(iv) *For Philippines* to Army Command Philippines
(v) *For Singapore* to Army Command
(vi) *For East Indies* to Army Command East Indies

Medical supplies were given first priority in shipment on the Japanese ships.

The medical stores were kept ready at the Medical Store Depot, Bombay. Later on, when the U.K. authorities found that the Anglo-Japanese Exchange was not coming forth as early as was anticipated they decided to despatch the replacement supply from Great Britain by a fast steamer. Supplies of mepacrine, pamaquin and several other drugs and textile stores which were found to be available in the Middle East Command were also sent to India for the purpose. Medical supplies remaining at Lourenco Marques from the first Anglo-Japanese exchange were also diverted to India.

There being delay in the *Anglo-Japanese Exchange* advantage was taken of the *American-Japanese Exchange* fixed to take place on 15 October 1943, at Marmagoa and medical stores which the Japanese vessel could accommodate were despatched.

Owing to the shortage of space on S.S. *Teia Maru,* the Japanese Exchange Ship, only about 800 packages of medical stores were sent to Japan. The remaining medical stores were kept at Marmagoa duly insured and the articles which were likely to deteriorate in storage at Marmagoa were returned to MSD, Bombay.

Meanwhile, in October 1943, the India Office transmitted to the Government of India (Defence Department) a fresh statement prepared by the War Office regarding medical supplies for prisoners of war in the Far East.

Owing to limited accommodation only "British Exchange" stores as finally decided by the British Red Cross, as well as, syringes, needles, emergency operating outfits, sulphaguandine, etc., were sent on the ship (S.S. *Teia Maru*) which returned after the American Exchange had taken place on 15 October 1943.

Although no decision was communicated to the Government of India by the Secretary of State for India as to when the Anglo-Japanese Exchange was likely to take place, a further supply of drugs, etc., in accordance with the new War Office list had been supplied by the British Red Cross and this supply had reached India in January 1944. The anticipated Anglo-Japanese Exchange at Marmagoa, however, did not eventually take place due to the altered situation in the war.

CHAPTER IV

Expansion in Organisation and Production during the War

EXPANSION OF MEDICAL STORE DEPOTS AND FACTORIES DURING THE WAR

Side by side with the question of procuring huge quantities of stores from various sources, problems arose of finding additional accommodation for storage and also of manufacturing additional quantities of stores in Government's own factories. These problems were met to a certain extent at the beginning of the war by building additional accommodation in each depot for storage and building expansion of the factories. These measures were not found adequate and considerable hired accommodation had to be secured both for storage and manufacture outside the existing premises. In addition to their expansion, resources of the trade had to be availed of. Even this was not enough and to meet the requirements of the war expansion, entirely new depots and additional factories had to be opened. These were as follows:—

1.	Medical Store Depot, Karachi ..	October 1940
2.	Shell Dressing Factory, Royapuram, Madras	May 1941
3.	Central Reserve Medical Store Depot, Raipur	1st Phase March 1942 2nd Phase August 1943
4.	ARP Medical Store Depot, Karnal ..	May 1942
5.	Medical Store Depot Factory at Chheharta (Amritsar)	January 1943

In addition, sub-depots were formed by each depot by securing additional accommodation as follows:—

Calcutta Depots

1. 209, Lower Circular Road, Calcutta
2. 32-Chowringhee, Calcutta
3. Jalapahar Sub-Depot, Darjeeling Hills
4. Patna Sub-Depot: (a) Rizwan
   (b) Golghar
5. Burdwan, Old Raj College Building
6. 58, Strand Road, Calcutta

Bombay Depots

1. Amrut Buildings, Bombay
2. Mahim Sub-Depot
3. Worli Building, Bombay
4. 'B' Ware House, Alexandra Docks, Bombay
5. Cold Storage Plant at Kirkee
6. Gamdevi Godown, Bombay
7. Ahmedabad Sub-Depot

Madras Depots

1. MES Godowns at George Town
2. 10 Military Barracks in Jaffer Serang
3. Port Trust Transit Shed Nos. 2 and 3

Lahore Depots

1. Napier Lines Block No. 9
2. Whiteway Laidlaw's Building
3. Old BMH Building at Sabathu, Simla Hills
4. Probyn Lines, Block No. 2
5. Grid Nos. 19 and 20 (Reserve Base Area)

The first steps to increase accommodation in depots and factories by 50 per cent. were taken in July 1940. Later in 1941, when the forward programme came into force and the target of expansion was known, it was found that the 50 per cent. expansion already constructed was not sufficient and further accommodation had to be found by each depot preferably by appropriating existing buildings whenever available.

NEW DEPOTS AND FACTORIES ESTABLISHED DURING THE WAR AS ADDITIONS TO THE PRE-WAR ESTABLISHMENTS

Medical Store Depot, Karachi

In August 1940, the Government of India sanctioned the formation of an additional Medical Store Depot at the port of Karachi for the period of the war. For establishing this depot accommodation to the extent of 78,500 sq. ft. was found at Karachi in the Port Trust Area.

The depot was opened on 7 October 1940, in charge of an IMS Officer. Although intended in the beginning to be purely a storage depot, for reserves, this depot rapidly took on the function of an issue depot as well, from 1 September 1941 to relieve the pressure of work on Bombay and Lahore Depots, and took over the responsibility of supplying the civil and military hospitals of Sind, Baluchistan and Western District. Indents for medical stores from Iraq were sent for compliance to this depot, from November 1941.

This depot along with its entire staff was later transferred to the DMS with effect from 3 February 1942.

Central Reserve Depot, Raipur

It was found essential to establish a large central reserve medical store depot to accommodate all war reserves of medical stores. It was estimated that storage space of 2,80,000 sq. ft. would be the minimum required for housing the reserves calculated on the basis of the accommodation required for one 'U' list. Construction work commenced in August 1941. The scheme was to build 17 sheds each of approximately 17,050 sq. ft., with railway sidings, separate office and administrative buildings. The land proposed for the depot was owned by the Bengal Nagpur Railway and was obtained on a rent of Rs. 87/- per acre per annum.

Five sheds were completed in 1942 and taken over by the DGIMS immediately, and an IMS Officer appointed to organise the depot. All the 17 sheds were completed by the end of 1942 and seven sheds were handed over to the DMS fully packed with reserves early in 1943.

The main difficulties experienced by this depot were deficiency of water supply and want of proper rain-proof ceiling for the sheds. Due to defective roofing, serious leakages occurred in the sheds during the heavy rains in the autumn of 1942.

To meet the CPO commitments and to accommodate the central steel reserves required for surgical instruments and appliances a proposal for the provision of extra accommodation at Raipur to the extent of 1,60,000 sq. ft. was sanctioned by GHQ at an estimated cost of Rs. 6,50,000. The following were some of the main points in the planning of this expansion:—

(1) The very large size of barracks which was recognised as the standard size for ordnance stores, i.e., 17,050 sq. ft. each and which was provided for in the first instance was not required for the expansion which was to deal mostly with retail work and not bulk transactions. The size fixed for the barracks was 150 ft. × 50 ft.

(2) Surface drainage was very essential to prevent flooding of store rooms as was proved by experience during the autumn of 1942.

(3) 2-ft. plinth to avoid flooding and also as white-ant protection.

(4) Floors in all buildings to be of cement concrete.

(5) Pent-top roofs with ceiling and efficient guttering.

(6) Verandah 4 ft. to be provided to all store rooms.

(7) Electric fittings including compound lights with triple pole-switch for the control of all inside wirings after depot hours.

(8) Provision of a room for storage of rubber articles with thicker walls, better ceiling, suitable cupboards and appurtenances.

(9) Provision of a shed 100 ft. × 50 ft. for the storage of straw situated away from stores sheds.

(10) Arrangements for shelves and tressels according to plan as well as further suitable division of some of the barracks from the medical stores point of view, such as, storage of poisons, excisable drugs, inflammable articles, etc., etc.

(11) Provision of residential buildings for staff.

(12) Arrangements for washing of bottles.

(13) Pucca dust-proof roads throughout the Depot.

(14) Facilities for cold storage.

(15) Internal telephone systems. Construction work was started in the beginning of 1943 and completed in August 1943. A steel section was also established in August 1942. Two 3-ton motor lorries and garages were sanctioned in August 1943. The lorries were, however, not available till early 1945.

The new Medical Store Depot at Raipur functioned both as Receipt and Issue Depot and dealt mainly with the CPO for supplies to troops overseas and for steel transactions with manufacturers of surgical instruments, as well as, ARP and civil reserves.

COLD STORAGE ACCOMMODATION FOR MEDICAL STORE DEPOTS INCLUDING COLD STORAGE DEPOTS IN HILLS

At the commencement of the war cold storage accommodation (196 sq. ft.) was only available at the Medical Store Depot, Madras, while other depots were using ice chests. Due to the growing volume of perishable drugs and rubber articles, cold storage accommodation was built in the depots at Bombay, Calcutta and Lahore Cantonment and additional cold storage accommodation was secured in April 1942 in the cold storage plant at Kirkee which belonged to the Imperial Council of Agricultural Research. This was augmented by accommodation in the hills at Jalapahar (Darjeeling Hills, 8,000 sq. ft.) and old BMH building at Sabathu (Simla Hills, 10,000 sq. ft.).

The refrigerating plants at the three Store Depots were completed in 1941 and cost Rs. 37,000 in all.

The cold storage capacity being:

Bombay ..	.. 660 sq. ft. × 13½ ft
Calcutta ..	.. 80 sq. ft. × 8 ft
Lahore Cantonment	.. 359½ sq. ft. × 10½ ft

At Sabathu all rubber articles of Lahore Depot and of Karnal Depot were stored as also articles of the CPO from Raipur.

The cold storage accommodation lent by Imperial Council of Agricultural Research was taken over by the DMS for storage of blood plasma, sera and vaccines in September 1943. The Central Research Institute, Kasauli, stored all the sera and vaccines imported from abroad and manufactured in their own Institute.

ARP Medical Store Depot, Karnal

An ARP Medical Store Depot was established at Karnal in June 1942. Initial provision was made for 10,000 hospital beds and 45,000 casulaties at an estimated cost of Rs. 16·3 lakhs. This scheme was in addition to the arrangements made by the individual provinces for ARP Stores. The buildings taken over were formerly used by the Malaria Institute of India and had floor space of 28,000 sq. ft. Cinema Hall gave another 2,500 sq. ft. and the Magazine Building 2,500 sq. ft.

In order to co-ordinate the purchase and issue of medical stores in connection with ARP a post of DADG (ARP Medical Stores) was created at GHQ in May 1942. The post was abolished in July 1943.

A portion of the Government of India reserve of quinine amounting to approximately 30,000 lb. was also stocked in this depot. Another portion of the quinine reserve amounting to approximately 50,000 lb. was stocked in Whiteway Laidlaw Building, Lahore, which was a sub-depot of Medical Store Depot, Lahore Cantonment.

ARP and Fire Fighting Arrangements in Medical Store Depots

Measures adopted in brief were:—

(1) Extra fire protection arrangements including provision of stirrup pumps and trailor pumps, hydrants, fire extinguishers, trained fire fighting staff, night watchmen, etc.
(2) Liaison with military authorities.
(3) Special arrangements for storing acids and inflammables.
(4) Construction of baffle walls, air-raid shelters, etc., at the depots.

ADDITIONAL ESTABLISHMENTS FOR THE MEDICAL STORE DEPOTS DURING THE WAR

In addition to considerable extra staff various new posts were created, e.g., Additional Officers (a) Class I Gazetted Officers on a grade of Rs. 450/- to Rs. 1,250/- p.m. (b) Assistant Managers (non-gazetted officers) on a grade of Rs. 250/- to Rs. 550/- p.m. The following is a brief summary of the expansion of ministerial and inferior establishments in the depots:—

(a) Extra staff to cope with very much increased clerical work in the depots in connection with the maintenance of thousands of bin cards, preparation of issue vouchers and receipt vouchers, correspondence, etc.

(b) Increased supervisory staff such as superintendents and assistant superintendents to supervise the work of the clerks and stores assistants.

(c) A special staff had to be employed to look after stores in additional accommodation.

(d) From June 1941, replacement of military accounts staff by the staff of the depots, in batches of twos and threes. Additional posts being:—

MSD Calcutta	8 Clerks
MSD Bombay	14 Clerks
MSD Madras	10 Clerks
MSD Lahore Cantonment ..	11 Clerks

(e) Due to the separation of stocks held in the depots into civil, military and CPO the depots had to prepare separate bin cards and prepare and submit special monthly stock position returns pertaining to civil, military and CPO separately, the staff of one assistant superintendent, two stores clerks sanctioned for the purpose for each depot was found insufficient. In March 1942, each depot was authorised to employ additional staff of 24 clerks, two typists, one diarist and one daftry. This strength was, however, reduced later from 1 January 1943 to nearly half the sanctioned strength, due to the transfer of local provision office stocks to Army Medical Stores (India).

(f) For checking, packing and despatching stores to indentors, subordinate staff of the depots had to be increased considerably from time to time.

(g) Owing to the increase in the statistical work of depots a separate statistical section was formed in each depot.

EXPANSION OF THE MEDICAL STORES SECTION OF THE OFFICE OF THE DGIMS DURING THE WAR

To deal with the enormously increased work the office of the ADG (Stores) was reorganised in 1941 into:—

(1) Indent Branch to deal with demands for stores.
(2) General Branch to deal with questions relating to the administration, budget, etc.

(3) Statistical Section.
(4) Purchase Branch.
(5) Civil Provisioning Branch.
(6) Indent Branch II to deal with the CPO demands.

ACCOMMODATION IN MEDICAL STORE DEPOTS TRANSFERRED TO THE DMS IN INDIA ALONG WITH STOCKS CONTAINED IN THE BUILDING TRANSFERRED

The following statement shows particulars of accommodation transferred to the DMS in India mostly towards the end of 1942:—

(1)	The whole of MSD Karachi	78,500 sq. ft
(2)	*MSD* Calcutta	
	209, Lower Circular Road, Ground floor and First floor	55,000 sq. ft
(3)	*MSD* Bombay	
	Mahim Depot	80,000 sq. ft
(4)	*MSD* Lahore Cantonment	
	Napier Lines Block No. 9	7,000 sq. ft
	Probyn Lines Block No. 2	7,000 sq. ft
	Grid Nos. 19 & 20 (Reserve Base Area)	7,000 sq. ft
(5)	MSD Raipur (7 sheds)	1,20,000 sq. ft
	Total Transferred	3,54,500 sq. ft

EXPANSION OF THE MEDICAL STORE DEPOT, LAHORE CANTONMENT DURING THE WAR

The first change contemplated was the expansion of Medical Store Depot, Lahore Cantonment, into a Reserve Base Depot of Medical Stores. This expansion was intended to meet the requirements of the North-West Frontier Province in the event of general mobilisation. The plan for expansion was as follows:—

> To expand to take up the duties of No. 1 Reserve Base Depot of Medical Stores and to issue medical stores to all field medical units of the covering troops and the Northern and the Western Armies on Z plus 15 days. Depots of medical stores were to be established at Peshawar, Rawalpindi, Kohat, Bannu, Chaman and Quetta for supply of stores to field medical units.

For the field medical units shown in the Pink Plan (Plan of Operations 1938) complete equipment was stored in the Medical Mobilisation Stores at Peshawar, Rawalpindi, Lahore, Poona, Lucknow and Quetta. Depots of medical stores and military hospitals which became general hospitals on mobilisation were to be established as complete units at their war stations.

The above was in brief the mobilisation scheme of the expansion of Lahore Depot into a Reserve Base Depot in the event of general mobilisation against invasion through the North-West Frontier of India. This general mobilisation did not take place. But increase of personnel of the Medical Store Depot, Lahore Cantonment was sanctioned as a special case owing to war expansion.

Statements A and B of Appendix VII show respectively the total authorised personnel for the Reserve Base Depot of Medical Stores, Lahore Cantonment, and the extra establishment authorised at the Medical Store Depot, Lahore Cantonment, on its being placed on war footing.

In order to meet any emergency in the North-West Frontier of India the DMS drew out a skeleton scheme for establishing a reserve base depot of medical stores. This scheme was never given effect to.

EXPANSION OF MEDICAL STORE DEPOT FACTORIES DURING THE WAR

At the beginning of the war the depots at Madras and Bombay normally called " the manufacturing depots " had factories attached to them. The total number of preparations manufactured in the factories was about 350. Special preparations like esters of hydnocarpus oil, chlorosol, first field dressings, were only manufactured at Madras, while the manufacture of bandages of all kinds was concentrated at Bombay Depot.

Each of the factories was under the control of a trained and highly qualified chemist. The Madras factory was provided with a research laboratory wherein all technical problems were investigated. The Factory Manager at Madras was also the Advisory Chemist to the DGIMS.

Before the commencement of the war the manufacture of hypodermic tablets and pyrethrum extract 2 per cent. had commenced at the Madras factory.

APPOINTMENT OF A CHIEF ADVISORY CHEMIST

As the war progressed a post of Chief Advisory Chemist was created in the office of the DGIMS as questions of a highly technical nature were constantly arising for decision. Many articles which were till then imported from abroad and were difficult to procure had to be replaced by suitable substitutes. Further it was also necessary to explore and utilise to the fullest extent the resources of drug manufacturers in India and to ensure that with the unprecedented increase of indigenous drug industry no deterioration in quality occurred. In all these matters expert advice and guidance was necessary. The Advisory Chemist at Madras was appointed to the newly created post of the Chief Advisory Chemist from May 1940.

The expansion of the army in India necessitated a rapid expansion of the two factories at Madras and Bombay. New buildings were constructed, extra machinery was installed and additional staff was sanctioned. Large orders for manufacture were placed on both the factories at Bombay and Madras with the result that work had to be carried on in double shifts.

First field dressings were manuactured at the Madras factory. Owing to the facilities and the existence of a nucleus of trained staff being available it was decided to start the manufacture of shell dressings also in that factory. The accommodation in the main factory being inadequate for this work inspite of expansion, it was decided to set up a new shell dressing factory as no accommodation could be made available in the depot compound. This new factory is referred to below as the Shell Dressing Factory, Royapuram.

SHELL DRESSING FACTORY, ROYAPURAM

With the progress of the war demands for first field dressings and shell dressings grew enormously. To meet the increasing demands a special Shell Dressing Factory with a working staff of 842 men was organised in the premises formerly occupied by Messrs. Massey & Co. in Royapuram, Madras, consisting of a three-storyed building with a total working space of about 40,500 sq. ft. The production target originally fixed was 30,000 shell dressings a day but the factory ultimately was producing 40,000 shell dressings a day.

Shell dressings were sterilised at the General Hospital Madras at night time. Additional staff was employed for the purpose. The total number of shell dressings produced at the Shell Dressing Factory, Royapuram up to September 1942, was 60,61,315. The cost of manufacturing dressing was nearly one rupee per two dressings. This Shell Dressing Factory was closed down in September 1943 as the MSD Factory at Chheharta (Amritsar) which also manufactured shell dressings in addition to other items and which was opened as an alternate factory (Madras being threatened with air raids) had started functioning by then.

Simultaneously with the production of shell dressings the manufacture of first field dressings was expanded and production reached a figure of about 2,40,000 dressings per month. The total number of first field dressings manufactured from the beginning of the war to September 1943 was 34,10,000.

Amongst other preparations the following were manufactured on account of urgent military demands in enormous quantities by the factories in addition to first field and shell dressings:—

(1) Anti-mosquito cream
(2) Chlorosol
(3) Hypodermic tablets of morphine sulphate
(4) Hydrargyrum ammoniatum
(5) Preventive outfits
(6) Quinine tablets
(7) Pills of all kinds
(8) Pyrethrum extracts 1 per cent. and 2 per cent.
(9) Syrup tolu
(10) Triangular bandages
(11) Bandages-loose wove of all kinds

MEDICAL STORE DEPOT FACTORY AT CHHEHARTA (AMRITSAR)

In order to relieve the pressure of manufacturing work at the factories at Madras and Bombay and as a standby in the event of the factory at Madras being dislocated as a result of air raids (the output of the Bombay factory being insufficient to meet all demands) a new Medical Store Depot Factory was established at Chheharta (Amritsar) early in 1943. This factory was also designed to produce pyrethrum extract, 2 per cent. ephedrine hydrochloride and first field dressings and later ARP dressings. Some of the equipment necessary for the above preparations was transferred from Madras and the rest purchased in India. The nature of work demanded in establishing this new factory could be realised from the fact that orders placed on this factory included two and a half million first field dressings and over eight and three fourth million shell dressings. The work of erection of the factory and installation of machinery etc. were carried out departmentally under the personal supervision of the Advisory Chemist, MSD Madras, with the help of two mechanics deputed from Madras and locally employed labour. A certain amount of machinery from Madras Depot Factory was transferred to Amritsar for this purpose. In addition some new machinery was also purchased.

Two buildings, the Nathumal Sachdev building on Grand Trunk Road, Chheharta, 13,850 sq. ft. and a hall, 5,336 sq. ft. in the Amritsar Cotton Mills were hired. Additional buildings were constructed at the former site (12,000 sq. ft.), while one more hall was requisitioned at the latter (15,240 sq. ft.). The former was the main factory where manufacture was carried out, the latter being used as storage accommodation. The total area occupied by the manufacturing part of the factory was 13,850 sq. ft. *plus* (the new hall when completed furnished further) 12,000 sq. ft. The total area thus occupied by the factory was 46,426 sq. ft. The magnitude of this undertaking could be realised when it is stated that the value of raw materials alone stocked in this factory was similar to that of a Medical Store Depot, *viz.*, over Rs. 40 lakhs. A gazetted post of Manager was sanctioned by Government and the Senior Assistant Chemist at the Bombay Depot was appointed to that post. The factory started work with effect from 1 January 1943.

PYRETHRUM PREPARATIONS

The manufacture of preparations of pyrethrum in India on a large scale was only undertaken after the beginning of the war. The Medical Stores Department was the first to start the manufacture of these preparations on a relatively small scale, *viz.*, a pyrethrum " army fly spray " which consisted of an alcoholic extract of pyrethrum flowers in a solution of soap. It was given up as it was found that the active principle, *viz.*, " pyrethrin " deteriorated in soap solution.

The manufacture of concentrated extract of pyrethrum (Extract Pyrethrum 2 per cent.) was first started in India at the Medical Store Depot, Madras, in the beginning of 1940. Due to the difficulties in obtaining ethylene dichloride as a solvent for extraction, a special method of manufacture, using methylated spirit was devised. Demands for this extract increased enormously and the production reached a figure of 450 gallons per month in 1942. All demands for this article up to the end of 1942 were met by production at Madras.

Large orders for pyrethrum fly spray 0·1 per cent. were placed on the depots, especially on account of " forward programme " commitments and a special plant for this purpose was set up at Madras in 1941 with a maximum capacity of 30,000 gallons monthly. A few days later it was found necessary to conserve stocks of kerosene oil and this plant was also used for the manufacture of pyrethrum extract 1 per cent, the maximum production of which at first was 15,000 lb. per month but was increased later to 30,000 lb. per month. A proportion of the orders demanded by the Local Provision Office and the CPO was met from this source, the balance being obtained from the trade who were given details of the method of production in the depot. In June 1942, the entire plant was removed to the Amritsar factory.

PROGRESSIVE INCREASE IN FACTORY PRODUCTION

The following figures show the rapid increase in the production of the Medical Store Depot factories, Madras and Bombay, over prewar level.

Total outturn in terms of index figures of the factories

Year	*Madras*	*Bombay*
1937–38	49,84,354	25,55,700
1938–39	64,22,522	24,90,508
1939–40	70,55,386	30,59,488
1940–41	1,88,18,672	1,05,19,085
1941–42	4,60,43,521	1,15,73,241
1942–43	3,13,12,387	1,25,36,823

Since the middle of 1942 difficulties due to the system of procuring raw materials and delay due to the new method of sub-mandating adopted by the Supply Department resulted in a general fall in production and the upward progress was not maintained. This was one of the natural results of the introduction of the new system of provision and procurement which will be referred to in a subsequent section. Orders in 1944 for the maintenance of a reserve of raw materials at the factories, however, removed the difficulties experienced during the latter part of 1942, enabling the factories to take up manufacture uninterruptedly.

REVIEW OF THE INCREASE IN THE CADRE OF IMS OFFICERS AND CIVILIAN GAZETTED OFFICERS OF THE MEDICAL STORE DEPARTMENT

In June 1940, a post of Additional Deputy Director General was created to supervise the medical stores and medical sections. The peace-time cadre of IMS Officers in the department just before the war commenced consisted of five officers, *viz.*, the ADGIMS (Stores) at Headquarters and the four DADG (Medical Stores) at Madras, Bombay, Calcutta and Lahore. A post of Chief Advisory Chemist at Headquarters was created in April 1940 and Advisory Chemist Madras Depot appointed to it, as mentioned earlier.

The Medical Store Depot at Lahore Cantonment was the first to get more staff. One additional IMS Officer and one additional Assistant Surgeon of the IMD (BC) were employed in April 1940.

In August 1940, an additional Medical Store Depot at Karachi was formed owing to change in the arrangements for shipping and delivery of medical stores from India Store Department, London.

A Medical Stores Supply Committee was formed under the chairmanship of the DGIMS in May 1940; the Chief Advisory Chemist—being its Secretary. From July 1940, valuable assistance to the Committee was given by Dr. J. N. Ray, Director of University Laboratories, Lahore, who had to be constantly consulted and later became a member of the Committee. To deal with the increased work of indigenous production of drugs, a post of Director of Production was sanctioned and Dr. Ray was appointed to the post in December 1940 and continued as such throughout the period of the war. In January 1942, he was given two assistants—one Deputy Director of Production and one Assistant Director of Production. Two civilian officers as second in commands at Medical Store Depots, Madras and Bombay, were sanctioned in September 1940.

The additional IMS Officer at Lahore Depot was particularly useful in testing and inspecting the instruments produced and supplied by the firms in the Punjab. A post of Director of Production (Surgical Instruments and Appliances) was created early in 1941 to be held by an experienced IMS surgeon who could advise on the quality of the instruments produced.

Further additions to the staff of DGIMS were:—

(1) Additional ADG in April 1941.

(2) Officer Supervisor in February 1941.

(3) Additional DDG in June 1941.

(4) IMD Officer Supervisor to assist in the work of Home Indents and to supervise the work in connection with statistics of medical stores and stock position in depots.

(5) Three additional Emergency Commissioned IMS Officers.

(6) The need for IMS Officers for active military duty being great, to meet the growing needs of the Medical Stores Department, the policy of recruiting men from the trade with business experience and pharmaceutical qualifications was adopted in June 1941.

(7) An IMS Officer as DADG in charge of new depot at Raipur and a retired IMD Assistant Surgeon (BC) as its manager.

(8) In November 1941, a Central Purchase Organisation was formed under a Deputy Controller of Purchase. This officer was selected from one of the additional officers who were recruited from the trade with business experience and pharmaceutical qualifications.

(9) One manager to look after the Karnal Depot for ARP Stores in June 1942. It may be pointed out in this connection that the stores cadre of IMD Officer (both BC & IC) was not increased during the war. On the contrary three posts of Assistant Surgeons IMD (BC) on the strength of the Medical

Stores Department were abolished during the war, two of them being substituted by civilians.

(10) In order to co-ordinate the purchase and issue of medical stores in connection with ARP a post of DADG was created from May 1942 to July 1943.

(11) To improve the output and quality of surgical instruments, a post of Deputy Director of Production (Instruments and Appliances) was created. His main function, apart from assisting the Director of Production, was to exercise close supervision during the process of manufacture of instruments.

(12) In order to deal with all medical supplies to be obtained by India under the Lease/Lend procedure and in connection with the import and export licences, a new post of Export/Import Officer was created in December 1941 for which the officer selected was one with considerable experience of the drug import trade and to enjoy the confidence of the trade.

(13) Advisory Chemist and Factory Manager at the Medical Store Depot, Madras, was transferred to Headquarters in January 1943 who later was especially entrusted with the work of organising and establishing factory at Chheharta (Amritsar).

(14) Manager for the Chheharta Factory was appointed for July 1943.

(15) In pursuance of the policy to release Assistant Surgeons in the IMD employed in the Medical Stores Department for military service, civilians were engaged on special terms. Two such civilians as Assistant Factory Managers were recruited in September 1943.

With effect from 1 July 1943 the officers of the Planning and Purchase Branches of the Stores Section were transferred to the Supply Department.

The total sanctioned cadre of the IMS, IMD and Civilian Gazetted Officers of the Medical Stores Department in January 1943 is shown in the following statement:—

Statement showing the Cadre of IMS, IMD and Civilian Gazetted Officers in the Medical Store Department as in January 1943

	IMS Officers	*IAOC*	*IMD (BC)*	*Civilian Gazetted Officers*
Headquarters ..	4*	1*	1	3
Bombay Depot ..	2	1	1	3 (including one for factory)
Madras Depot ..	1	..	1	3
Calcutta Depot ..	1	..	1	1
Raipur Depot ..	1	..	1	1
Lahore Depot ..	2	..	1	1
Chheharta Depot ..	..	..	..	1

* Director of Production

Officers—Planning Branch and Purchase

1. Director of Production (Drugs & Dressings) 2. Deputy Director of Production (Drugs & Dressings) 3. Deputy Director of Planning (Technical Instruments and Appliances) 4. Assistant Director of Production (Instruments and Appliances) 5. Assistant Director of Production (Drugs and Dressings)—I 6. Progress Officer	Transferred to Supply Department (Medical Division) on 1-7-1943

List of Industrial Planning Officers (Civilians)

One at CRI Kasauli
Two at MSD Calcutta
Three at MSD Lahore
Two at MSD Bombay
One at MSD Madras

Summary of Officers transferred to Supply Department in July 1948

Planning Branch (Surgical Instruments & Appliances) ..	4
Planning Branch (Drugs & Dressings)	3
Planning Branch, Progress Officer	1
Purchase Branch	10
Industrial Planning Officers	9
Total ..	27

DEVELOPMENT OF INDIGENOUS PRODUCTION SEPTEMBER 1939 TO JULY 1943

Many drugs, surgical instruments, biological products and certain items made from rubber were not produced in India and had to be imported. The imports became progressively difficult after the outbreak of the war. The time lag of obtaining stores from the United Kingdom increased even up to 18 months. To add to these difficulties the price of the most of the essential requisites had considerably risen.

Although many imported articles were gradually being replaced by those manufactured in the country, India had still to depend on foreign resources for the supply of basic materials required for producing finished products. Very few complex or composite articles could be produced without the importation of some essential components. Spare parts of machinery had to be imported. There was also the question of providing sufficient technical experts for industry. In short, it was obvious that supplies from Indian industry were subject to definite limitations.

In October 1939, Colonel Sir R. N. Chopra, Director of Biochemical Standardisation Laboratory, Calcutta, made a survey, indicating the position of drug supply in India[1].

The supply during the war by Medical Stores Department and by the trade was in the ratio of 1 to 10. The drugs obtained through the trade, may roughly be divided into supplies obtained by import and supplies by indigenous production.

(i) *Supplies obtained by Import:* The value of drugs imported into India through the trade during the war amounted to two and a half crores of rupees annually. The value of proprietary medicines being Rs. 50 lakhs and of quinine and its salts 25 lakhs.

(ii) *Supplies obtained by Production in India:* The activities of the Indian drug factories were confined until the commencement of the war almost exclusively to the manufacture of easily made chemicals and proprietary medicines.

During World War I the manufacture of essential oils, such as, Sandalwood oil, Cleum Anethi, Lemongrass oil was undertaken. The manufacture of vegetable oils by expression from seeds instead of exporting seeds increased enormously afterwards. Gradually certain factories took up the manufacture of more difficult items, such as, extraction of Santonin and the preparation of extracts of Belladonna and other drugs of vegetable origin, manufacture of Ether and Chloroform, Chloral Hydrate, Ethyl Chloride, Cleum Terebinthinae, etc. The Medical Stores Department had been the pioneer manufacturer in India of many drugs, such as Ether, Hydnocarpus Oil, Lysol and many surgical dressings and its two factories at Madras and Bombay had been a model for the drug factories of India.

On the outbreak of World War II the Medical Stores Department set about preparing for the greatest degree of self-sufficiency. In the Medical Store Depot factories most of the liquid alcoholic preparations, namely, tinctures, extracts etc., were manufactured which confirmed the requisite B. P. standard. All ointments, most tablets and most of the surgical dressings were also manufactured in Medical Store Depots. The depots ceased to manufacture a particular drug when it was found that the particular item was manufactured by Indian firms provided such supply was more economical and the products conformed to the necessary standards. Thus every encouragement was given to the Indian industry to increase production.

The following were some of the important items which were transferred from the imported to the indigenous list early in war:—

1. Ether Anaesthetics
2. Ethyl Chloride
3. Acidum Hydrochlorium
4. Acidum Nitricum

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[1] His report in this connection is enclosed at Appendix VIII which also gives a summary of the essential drugs and medicinal chemicals available in India, particularly, those which could be manufactured in India under emergency conditions and information on various other useful matters, such as, medicinal chemicals which could be produced from neutral countries and essential drugs and medicinal chemicals whose substitutes were available in India.

5. Alumina Sulphate
6. Hydrogen Peroxide
7. Mustard Compressed
8. Potassi Acitus
9. Potassi Citrus
10. Quinine Hydrochloridum Acidum Ampoules for infection
11. Santoninum
12. Sodii Citrus

A departmental committee was established in February 1940 to investigate the sources of supply of drugs, chemicals and biological products for the Medical Stores Department, the use of suitable substitutes and other measures of economy during the war.

The committee drew up a list of drugs, medical chemicals and sera which were then considered " essential drugs " for the armed forces and the civil population. This list was circulated to all the administrative medical officers with the request that they should warn all the medical officers under them to exercise the strictest economy in the use of such drugs. The list of essential drugs was revised from time to time[2].

Surgical Instruments

As regards the question of supply of surgical instruments and appliances to the Defence Services and the civil population the position at the outbreak of the war was that about 1,800 surgical instruments and appliances both imported and indigenous were stocked by the Medical Store Depots covering practically the whole field of surgical practice including war surgery. Considerable headway had already been made by those Indian firms which dealt with these articles and at the commencement of the war the Medical Store Depots were purchasing from the trade about 360 items of instruments and appliances made in India from indigenous steel.

No instruments were manufactured in the Medical Store Depot factories. There was, however, a repair workshop at Madras Depot where instruments and appliances were resharpened, replated and repaired.

With the progress of the war, the number of instruments manufactured in India rapidly increased. Mild steel required for the manufacture of some instruments was available in India. High grade steel for manufacture of special instruments like fine cutting instruments, surgical needles, etc., had to be imported. Out of a large number of factories in India which had taken up the manufacture of surgical instruments at one time or another only about six factories were known to manufacture instruments and appliances of good quality. In most cases, however, the requisite standard as regards quality had not been attained. The position on the whole was that the fine cutting instruments, hypodermic and surgical needles and optical apparatus were not satisfactorily produced in India. There was thus a vast scope for the Indian industries to expand.

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[2] An instructive summary of the development of the Indian pharmaceutical industry made by Mr. P. M. Nabar, Chief Advisory Chemist, Directorate General Health Services, will be found at Appendix IX.

Drugs and Dressings

In September 1939, so far as medical stores were concerned, the position of drugs imported from abroad, manufactured in Medical Store Depot factories and purchased in India from the trade per annum was as follows:—

Value of drugs imported from abroad (by Medical Store Depots)	Rs. 7,72,000
Value of drugs manufactured in Medical Store Depot factories	Rs. 5,20,000
Value of drugs purchased in India (by Medical Store Depots).	Rs. 15,80,000

The total value of drugs imported from abroad and manufactured by the Medical Store Depots and purchased in India was approximately Rs. 23,52,000 and this represented only a small percentage when compared with the total value of drugs imported from foreign countries into India by the trade which then came to approximately Rs. 2½ crores per annum. This Committee established in May 1940 was at first called the Drugs Supply Committee and later the Medical Stores Supply Committee[3].

The production of indigenous drugs covered the following:—

(1) Annual production in India was 1,75,000 gallons of tinctures, liquid extracts and other spirituous preparations.

(2) Acids 5,800 tons.

(3) Inorganic chemicals, such as, Sodium Sulphate, 5,000 tons. Sulphates depended on imported American Sulphur.

(4) The only refined alkaloids which were made in any quantity were Strychnine (15,000 lb. also exported after meeting Indian needs) and Morphine.

(5) Considerable quantities of proprietary, liquid and solid drugs were manufactured. Certain amounts of drugs were also exported from India. This trade amounted to Rs. 41 lakhs per annum. The chief exports were vegetable oils, such as, Oleum Arachis, Oleum Reoini, Oleum Sesame, Oleum Line etc., and essential oils, such as, Sandalwood oil and Lemon grass oil.

[3] The duties of the Committee were to advise the DGIMS in the matter of drug supplies, drug substitutes and economy of drugs during wartime, also the solution of wartime problems concerning the supply of drugs, surgical instruments and medical stores. The first members of the Committee were the Financial Adviser (Military Finance), DMS, Director, Biochemical Standardisation Laboratory; Chief Chemist, ADG Central Revenues with the DGIMS, as Chairman and the Chief Advisory Chemist to the DGIMS as Secretary. The first meeting was held on 13 May 1940. Ten more meetings were held between that date and February 1944. In December 1941, the Committee was reformed and enlarged under the Department of Supply. The following new members were added representing:—

1. The Education, Health and Lands Department
2. Commerce Department
3. Controller General, Army Provision (Eastern Group)
4. Indian Chemical Manufacturers' Association
5. Director of Production (Drugs and Dressings)
6. Director of Production (Surgical Instrument and Appliances)

(6) *Amongst alkaloids*, Strychnine from Calcutta and Morphine from Ghazipur and the Glucoside Sanatonin from Kashmir were exported. There was also a large trade in Senna, Nux Vomica and various seeds of vegetable oils, such as, Castor seed, Arachis seed etc.

ACTION TAKEN TO INCREASE INDIGENOUS PRODUCTION

In March 1940, a list of the important imported drugs was *circulated to* the principal drug manufacturers in India in order to stimulate their production from indigenous materials followed by a notification by the Commerce Department asking firms to state the existing and possible outputs of all the drugs they manufactured.

The assistance of the various Government departments in India was sought in the development of the resources of India in essential drugs or their substitutes. A list of vegetable drugs included in the British Pharmacopoeia was sent to the Imperial Council of Agricultural Research who helped greatly in locating sources of these vegetable drugs and who investigated the possibility of *growing these plants in India*. The Medical Stores Supply Committee decided after careful consideration of the available clinical evidence that varieties grown in India of Senega, Gentian, Aconite, Ipomoea, Rheum, Colchicum, Lobelia, Colocynth *and Datura may* be used in place of the B.P. variety not grown in India. The corresponding B.P. and Indian varieties were as follows:—

	B.P. Drugs	*Indian Variety*
1.	Polygala Senega	Polygala Chinesis (Linn)
2.	*Gentiana Lutea*	*Picrorhiza Kurroa*
3.	Aconitum Napellus	Aconitum Ferox
4.	Ipomoea Purga Hayne	Ipomoea Turpeth
5.	Rheum Palmatum Linn	Rheum Emodi
6.	Colchicum Autumnale Linn	Colchicum Luteum
7.	Citrullus Colocynthis Schrad	*Citrullus Colocynth (Slightly different* variety)
8.	Lobelia Inflata Linn	Lobelia Nicotianifolia
9.	Datura Stramonium Linn	Datura Fastuosa

Pyrethrum: The necessity of growing Pyrethrum in India for the preparation of Pyrethrum extract was taken up in 1940. Seed was obtained from the Plant Pathological Laboratory, England, and distributed to Indian provinces and Kashmir. The development in growing Pyrethrum was most vigorous in Kashmir where 80 tons dried flowers were obtained early in 1943. A further quantity of 5,600 lb. seed was obtained early in 1943 from Kenya. In September 1943, the following acreage was under cultivation in Pyrethrum from this seed:—

Kashmir ..	.. 2,000	*acres*
Punjab Hill States	.. 300	„
Madras ..	.. 1,600	„
Assam ..	.. 400	„
Total	.. 4,300	„

Synthetic Cod Liver Oil: At the commencement of the war there was a shortage of cod liver oil and attempts were being made to obtain a substitute, *viz.*, shark liver oil, which in crude form contained ten times the amount of vitamin 'A' found in cod liver oil. The only vegetable oil which was known to contain a considerable amount of vitamin 'A' was red palm oil. A consignment of this oil was ordered from Malaya where this type of palm tree grew well. This oil had a nauseous taste and disagreeable smell but after experiments carried out in the Medical Store Depot, Madras, it was found possible to remove this taste and to make this oil sufficiently palatable for use. As it contained vitamin 'A' only and no vitamin 'D' steps were taken to manufacture Irradiated Ergosterol at the Indian Institute of Science.

The Imperial Council of Agricultural Research stressed the possibility of developing the production on the coasts of India of shark liver oil—an industry which thrived in Cochin (about 1874). Shark liver oil contains on an average 10,000 International Units of vitamin 'A' and 500 International Units of vitamin 'D' per gram. The Madras Government started the collection of shark liver oil on a considerable scale in 1941 and established a special factory for the manufacture of shark liver oil standardised with Oleum Arachis to contain 1,500 International Units of vitamin 'A' per gram. The Department of Industries, Bombay, also set up arrangements in 1942 for the large-scale collection of shark liver oil along the coast of the province. This industry also developed at Travancore, Karachi and Baroda and in the Persian Gulf. In 1942, 20,446 gallons of the standardised oil were produced by Madras Government. Travancore Government estimated that they could spare 8,000 gallons shark liver oil after meeting their own requirements.

Glandular Products: Imperial Council of Agricultural Research also advised extending the production of glandular products and the manufacture of liquor adrenaline hydrochloride, etc. pituitary liquid lactose, peptone and calcium lactate was taken up with the Animal Husbandry Commissioner to the Government of India. Also sufficient Adeps Lanae was recovered in wool factories to provide the Medical Stores Department with their full requirements of this item.

Mineral Products: The Geological Survey of India gave advice on the possibility of obtaining in India certain mineral products such as arsenious oxide and creta.

Opium Products: The Central Board of Revenue helped in the production of morphine salts and codeine in the Opium Factory at Ghazipur. Only about 200 pounds of these salts were made annually before the war, but the annual production in 1942 approximated 1,500 lb. of morphine salts and 500 lb. of codeine of B.P. quality. Large quantities of crude morphine were also being supplied to Australia and the U.K. Codeine was made both by extraction from residue after extraction of morphine and by the synthetic process from morphine at the Central Revenues Control Laboratory, Delhi.

Forest Products

Various products were investigated with the help of the Forest Research Institute, Dehra Dun, such as creosote, pix liquidum, oleum picis and other drugs derived from wood. The possibility of manufacturing creosote and guaiacol carbonas from wood tar distilled at Almora was also investigated.

Other Alkaloids

Attempts were also made to increase the number of alkaloids made in India. Atropine sulphate in small quantities was made and this industry was developed further.

A method of manufacture of atropine sulphate was worked out and given to a firm in Kashmir to develop it on a large scale. Considerable quantities of atropine sulphate have since been obtained from this source. The preliminary work for the manufacture of hyoscine was done by a chemist working under a scheme financed by the Indian Research Fund Association.

The manufacture of emetine hydrochloride was also attempted, but the difficulty in this case was the world shortage of ipecacuanha during the war. A certain amount had been obtained from Mungpoo in Bengal, but the quantity grown there was not sufficient for India's needs. The ipecacuanha in stock in Medical Store Depots at the beginning of the war and all since purchased was reserved for the extraction of emetine. Moreover, the manufacture of galenical preparations containing ipecacuanha was discontinued during the war.

Certain quantities of caffeine were also produced in India from tea waste and an extension of this manufacture was being investigated by the Director, Tocklai Experimental Station of the India Tea Association. The extraction of caffeine was thus undertaken on a very large scale and all India's requirements were obtained locally. Some of the indigenously manufactured caffeine was also exported. Strychnine was another alkaloid exported in large quantities. Twenty-five pounds ephedrine hydrochloride per month were made in the Medical Store Depot factory at Chheharta (Amritsar).

Supply of Anaesthetics

The manufacture of anaesthetics in India had developed by the time the war started and all the anaesthetic ether required by the Medical Stores Department was obtained in India. Plant for the manufacture of anaesthetic ether was greatly extended until 1,500 lb. per month were produced. One of the firms which had started manufacture of ether had also a plant for the manufacture of chloral hydras and ethyl chloride and was able to produce these two items in India in sufficient quantities to meet the requirements of India provided the supply of liquid chlorine was sufficient. Liquid chlorine was being manufactured near Calcutta.

Nitrous Oxide: This anaesthetic was manufactured in factories associated with the Indian Oxygen and Acetylene Company in England, South Africa and Australia. There was no sufficient demand in India to establish a factory. No difficulty had been experienced in obtaining supplies of nitrous oxide at the commencement of the war but cylinders were scarce. Cylinders were not made in India.

Acids and Alkalies: Unfortunately India had no source of sulphur and as all acids depended upon sulphuric acid for their manufacture, this was a very severe handicap to the development of chemical industry. Two large firms, Tata's and Imperial Chemical Industries were both in the process of erecting large factories for the manufacture of alkalies from indigenous sources. A factory already existed for the manufacture of liquid chlorine but not sufficient to give an exportable surplus. India was also handicapped by the lack of any indigenous source of bromine and iodine.

Acetic acid was manufactured from locally made calcium acetate by the Mysore Iron Works and this factory was able to supply sufficient quantities for the whole of India.

Potassium Permanganate: Potassium permanganate was manufactured by two firms in India but exportable quantities could not be guaranteed.

Ammonia: Ammonia was not manufactured in India in the early years of the war from basic indigenous materials.

Oxygen: Oxygen was made in India in large quantities but cylinders were a difficulty.

Coal Tar Derivatives: The Bararee Coke Company was able to establish manufacture of saponified cresol, carbolic acid and cresylic acid, the last named being used in the manufacture of lysol. The Rideal Walker co-efficient of the saponified cresol, however, had reached only 12 as against 18 in imported saponified cresol.

Until a satisfactory coal tar distillation industry was established, it was impossible to obtain in India many of the fine chemicals used in large quantities in medicine.

The establishment of a large and well-organised synthetic drugs industry was intimately connected with the basic chemicals industry. Very few of the necessary basic chemicals were then made on a large scale in India. There was also no well-developed chemical engineering industry to fabricate the plant necessary for the manufacture of complicated synthetic drugs. This matter was fully discussed with the members of the Grady Mission (U.S.A.) when they toured India in 1942. The Medical Stores Department gave the mission a list of manufacturing plants including a ten-ton coal tar distillation unit which was required to expand the production of coal tar drugs in India. Considerable equipment was ordered from America to increase the output of various drugs in India.

An attempt was made to manufacture a few fine chemicals such as sulphanilamide, arsenical preparations such as neoarsphenamine, etc., but these were dependent on imports for many of their raw materials. The principal basic material for these chemicals was aniline. Aniline was obtained from Benzene which was nitrated and then reduced. This chemical or a derivative of it was the starting point for some of the most important synthetic drugs such as sulphonamide atebrin, plasmoquine, luminal, veronal, aspirin, novocaine, mercurochrome, acriflavine, neostibosan and neoarsphenamine, etc. Aniline was produced in negligible quantities from bensone produced in India.

Organic Drugs

Large quantities of the following organic drugs were manufactured during the war by firms in India—nicotinic acid, nikethamide, amyl nitrate, calcium gluconate, calcium lactate, soluble barbitone, ethyl chloride, thiodiphenylamine, liquor formaldehyde, chiniofonum and argenti proteinas. Carbolic acid of 90 per cent. purity was made in India by purchase of a plant.

Agar

This became scarce after the entry of Japan into the war. The Governments of U.K. and U.S.A. foreseeing supply difficulties enforced measures to control this substance. In India too, the stocks were limited and it was found necessary to conserve them as far as possible. An order for a bulk supply was placed on the U.S.A. early in 1942. Ceylon moss found on the shores of Ceylon was investigated as a source of agar and was found to be a very satisfactory raw material. A considerable amount of agar from this source was made in the Medical Store Depot Factory, Madras. Another seaweed gracillaria lichenoides was found in the Chilka Lake but this source did not prove successful owing to the difficulty in getting uncontaminated seaweed.

Besides its use in the preparation of culture media for bacteria agar was also used for making embrocations and emulsions with liquid paraffin which found a large sale in India. Apprehending that an indiscriminate use of this substance would precipitate a situation when there may be no agar available for essential bacteriological purposes, its use was restricted to bacteriological work only.

With a view to making the supply situation easier the manufacture of agar was started at the Medical Store Depot, Madras, with Ceylon moss and gracillaria. This depot was potentially capable of producing about 120 lb. a week or 6,240 lb. of agar a year. It was anticipated that the local production would go a long way to meet the needs of Medical and Public Health Departments pending the arrival of supplies from the U.S.A. The U.S.A. supplies, however, did not arrive. Bad weather conditions and defective raw material considerably impeded the progress of local manufacture with the result that there was a very restricted output of this substance. Further, stocks of Ceylon moss were not forthcoming. It was, therefore, decided to restrict supplies to (1) the CRI Kasauli, (2) the Haffkine Institute, Bombay and (3) the King Institute, Guindy, the three major laboratories engaged in the manufacture of vaccines and sera.

In order to meet the situation a further supply of 6,000 lb. of Ceylon moss was ordered from Colombo and orders for four tons of sracilaria lichenoides were placed on the Director of Development, Orissa. The CPO stated that the supplies of Ceylon moss were very difficult to obtain from Ceylon and that they were then investigating the possibility of obtaining supplies from South Africa.

A portable dehydrating plant was purchased for Madras Depot for drying the jelly obtained in extracting the seaweed. In spite of all attempts the local manufacture of agar in India during the war did not prove to be an entire success. In order to control the stocks of agar in India and of raw material used in the manufacture of agar, an agar control order was issued by the Government of India in June 1942, controlling the sale and use of agar and licensing the manufacture of agar.

Analytical Reagents: Acids and other reagents of analytical purity were extensively manufactured in India during the war. Stains such as congo red, eosin, methyl violet 6-B, etc., were made. Peptone, sodium tauroglycocholate and some other reagents were produced in the country for the first time.

Miscellaneous Items: Chloral hydrate and trichloroacetic acid were two difficult items which one firm was able to produce on a large scale. Distillation of essential oils increased one firm specialised in the manufacture of essential oils from indigenous raw materials such as lavender oil, lemon oil, etc.

Neutral Glass

Several firms were manufacturing neutral glass for ampoules, etc. These were found to be satisfactory on test. All kinds and sizes of bottles were made by several firms in different parts of the country. The following scientific apparatus and appliances needed by the Medical Stores Department were manufactured in India:—

Dreyer's pipettes
Dreyer's Agglutination tubes
Dreyer's dilution tubes
Test tubes
Test tubes (felix technique)
Burettes
Cylinders (graduated)
Petri dishes
Flasks flat bottomed
Flasks conical
Flasks round bottomed
Beakers
Funnels
Hydrometers
Pipettes (all sizes graduated)
Thermometers
Urinometers
Glass tubing
Watch glasses
Microscope slides
Drop bottles (Chloroform & Ether)
Measure and minim glasses
MacCartney's bottles

Sundries

The following "sundries" items were taken up for indigenous manufacture during the war:—

Drainage tubing
Autoclaves
Water baths
Centrifuges (hand)
Rubber rings
Rubber corks
Apparatus cholera
Enamelled iron irrigators
Enamelled iron ware e.g., urinals, basins, etc

Surgical Catgut: Large quantities of surgical sterilised catgut were required by the army. In 1941, the Secretary of State for India intimated that there would be considerable difficulty in procuring the enormous quantities required. Manufacture on a small scale was started in the Central Research Institute, Kasauli. The raw gut was obtained from Sialkot, cut up into appropriate lengths, inserted into tubes and sterilised in xylol. Ten thousand tubes per month were produced from 1941.

Samples of sterilised surgical catgut made and sterilised by a firm in India were tested and found not sterile. In view of the danger involved in the use of contaminated catgut in surgical operations urgent measures were taken to issue an order under the Defence of India Rules called the *Surgical Ligature Control Order*, 1943, forbidding the manufacture for sale of sterilised ligature or suture except under and in accordance with the conditions of a licence issued by the DGIMS. The Director, Central Research Institute, Kasauli, was appointed Chief Inspector of Ligature Factories under the Surgical Ligature Control Order. Only one licence was granted during the war and that was to the Central Research Institute, Kasauli, where sterilised surgical catgut was made for Government requirements.

Two more firms fitted premises to manufacture sterilised catgut. One of these firms had its qualified staff recognised as satisfactory.

Rubber Goods: This industry developed during the war but only a very few firms manufactured rubber waterproof sheeting, hot water bottles, air pillows, rubber ice bags and rubber corks. No exportable surplus, however, of these articles was available during the war. Manufacture of rubber tubing for medical purposes was also developed.

Glassware and Earthenware: Unstoppered bottles of moderately good quality were made in India. They were hand-made and in consequence liable to be uneven in quality and not up to a stated specification. It was not always possible during the war to obtain satisfactory narrow mouth ground-glass stoppered bottles in India. The quality of the glass also varied from batch to batch as probably adequate chemical control was not exercised. There were a few satisfactory pottery firms. One of them erected a modern earthenware factory and supplied good quality earthenware supplies such as, bed pans, urinals, wash-hand basins and lavatory basins etc.

STATISTICS OF INDIGENOUS PRODUCTION OF DRUGS AND OTHER MEDICAL STORES IN INDIA

Towards the latter part of 1940 the DGIMS called for the following information through the Government of India, Department of Commerce:—

(a) The name and location of manufacturers in India of drugs, chemicals, etc., and surgical instruments and appliances.

(b) The names of the articles in question and their quantities manufactured in a normal year (i) from entirely indigenous materials and (ii) partially from imported materials. In such latter cases the quantity of the imported articles used in the manufacture should be specified.

(c) The then existing output of each item by each manufacturing concern.

(d) The extent to which this output could be increased at short notice without any additional plant from abroad or with added equipment; if so, the amount of notice required for increased capacity of production should be mentioned.

Information obtained was extremely useful in connection with the procurement of the huge quantities of stores required to be collected for the forward programme in the form of ' U ' lists, and also served as a stepping stone in the development of indigenous manufacture of drugs in India.

A close liaison was throughout maintained with the drug manufacturers in India. Practically all the chemical manufacturers in India were members of the India Chemical Manufacturers Association, which was recognised by the Government as a representative association of the drug industry. The Medical Stores Department frequently consulted this Association. Technical advice was often given to firms manufacturing new drugs and for testing them.

Owing to the particular difficulties associated with the manufacture of sterile drugs, specifications of all the items required were drawn up. The Director, Central Research Institute, was Inspector of Factories producing these items. No firm was allowed to manufacture these items for Government until its staff had been passed as satisfactory and its premises inspected and all arrangements for manufacturing and for testing the final product made. Seven firms were approved. As stated above, Dr. J. N. Ray was appointed Director of Production (Drugs and Dressings) in December 1940.

The testing of samples and inspection of stores grew with the development of indigenous production. The staff of the Biochemical Standardisation Laboratory, Calcutta, and the laboratories attached to the Medical Store Depots in Madras and Bombay, were used to test drugs in their respective areas. Later two assistant chemists were appointed and given laboratory accommodation in the Delhi University. The Central Research Institute, Kasauli, helped in the testing of sterile products and the Director of the Food Research Laboratories, Coonoor, in testing vitamin preparations.

Ascorbic Acid Tablets

This was an important item for the Middle East theatres of war and the very low level of the stocks held on behalf of the army in 1940 caused considerable anxiety.

The question of investigating the supply of highly concentrated citrus essences was discussed at the Eastern Group Conference in October 1940 and it was decided that the Government of Palestine would be approached to obtain full details of samples, prices, quotations, etc. as it was anticipated that Palestine could expand this industry rapidly. It was further suggested that similar action may be suggested to the Middle East Command whose demands for anti-scorbutics were large and who were then obtaining ascorbic acid tablets from the United Kingdom as they were unable to get them from India.

At the same time, it was realised that these essences, however good, would involve an additional weight factor in army transportation owing to added bulk. Arrangements were, therefore, made that while these enquiries were proceeding and while experiments in the production of ascorbic tablets in India were on trial immediate supply of the reserves as required should be made from Palestine.

In this connection it may be of interest to note that experiments were carried out in the Medical Store Depot, Madras, on ambla tablets, ambla being a fruit abundantly found in South India and rich in vitamin 'C'. Pending arrangements for adequate supply of ascorbic acid tablets, ambla tablets manufactured at the Medical Store Depot Factory, Madras, were supplied during the early stages of the war (1940-41) in large quantities to meet all urgent demands from the Middle East Command.

Helping India Manufacture

Large amounts of ethyl chloride were being produced in India. Glass containers for this item were for a time difficult to obtain, but a firm in Calcutta produced a container which was considered satisfactory.

EXPANSION OF EFFORTS IN INDIGENOUS MANUFACTURE OF DRUGS AND STORES BY MEDICAL STORES DEPARTMENT

The department rapidly began to manufacture, besides large quantities of pills, tablets and special dressings, more than 350 items of medical supplies which were formerly imported. Indian army also began to produce equivalents and substitutes for imported drugs. The extent of expansion may be judged from the great increase in local purchase by the department—these increased in value from about 16 lakhs in 1938-39 to over one crore in 1941 and to nearly three crores in 1943.

Since the outbreak of war, India began to manufacture chloroform, chloral hydras, bleaching powder, acetic acid, carbolic acid, cresol, lysol, turpentine, ammonium chloride, carbon tetrachloride, caffeine ampoules gum saline, anti-mosquito cream, ethyl chloride, formaldehyde, nikethamide, oil of anisi, stains, xylol etc. Production of anaesthetic ether rose from 1,500 lb. to 15,000 lb. per month.

Large-scale production of potassium permanganate, creosote and glucose was also started. Alkaloids such as emetine hydrochloride and atropine sulphate were made in addition to strychnine hydrochloride which was previously manufactured on a large scale. The manufacture of tincture, liquid extracts reached 1,75,000 gallons per annum.

The Medical Stores Department had endeavoured on many occasions to stimulate the growth in India of many of the pharmacopoeial drugs. It had also utilised the species of many vegetable drugs already growing in India in place of the British pharmacopoeial variety of Gentain, Datura, Rheum, Lobelia, etc. This was done after verification that the therapeutic actions of the drugs were similar to that of the pharmacopoeial species of the drugs.

The Medical Stores Department had also helped the extensive production in India of oleum hydrocarpi, a vegetable oil made as a cottage industry in Malabar. This oil was the chief therapeutic agent in the treatment of leprosy. In Madras factory the largest plant in the East for the manufacture of the ethyl esters of hydrocarpus oil was installed.

The manufacture of essential oils had not been taken up extensively. The department by placing orders with one firm had been able to obtain certain quantities of peppermint oil and dill oil. The Medical Stores Department had been using the Indian manufactured eucalyptus oil, although it was below the B.P. standard in its content of active principle ' cineole '.

Large quantities of fixed oils, such as oleum ricini, oleum arachis and oleum sessame were produced on an extensive scale in India. It was the Medical Stores Department which stimulated the production of shark liver oil in India. Shark liver oil contained vitamin ' A ' in a much higher percentage than found in cod liver oil. By diluting shark liver oil with a good quality groundnut oil a satisfactory substitute for the cod liver oil was obtained. Large quantities had been purchased in India by the Medical Stores Department. This was a revival of an old industry established 80 years ago by the Civil Surgeons of Cannanore and Cochin which had since died out.

Analyses of samples of drugs to test their quality, purity and potency had been undertaken by the Biochemical Standardisation Laboratory, Calcutta.

With the transfer of the Procurement Branch to the Supply Department in July 1943 the responsibility of indigenous production of drugs and dressings, surgical instruments and appliances and of other medical stores required for the prosecution of the war was transferred to them from the DGIMS. Incidentally the Directors of Production were also transferred to the Supply Department. All further development of the indigenous drug industry was then the responsibility of the Supply Department. In this connection Dr. J. N. Ray, O.B.E., Director of Production, Drugs and Dressings and Deputy Director General (Development) Ministry of Industry and Supply, had made a comprehensive and useful survey of the drugs industry in India[4].

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[4] His conclusions are given in Appendix X

MANUFACTURE AND SUPPLY OF SERA AND VACCINES

The manufacture and issue of *all vaccines required by the* army in India, and the stocking and issue of all imported therapeutic and prophylactic sera for military and civil use were in peace time centralised at the Central Research Institute, Kasauli. Stocks in September 1939, were at a level equivalent to about two years requirements.

The vaccines manufactured in greatest quantity were TAB and anti-cholera. Antivene and anti-rabic vaccines were also prepared in large quantities, *considerable reserves of the former being maintained* in the form of bulk concentrates.

Stocks of imported sera for army use were obtained from the United Kingdom by monthly imports which were regularly adjusted so as to maintain a level sufficient to meet four months' average demands from military hospitals in addition to certain predetermined quantities required for mobilisation.

At the outbreak of war the position of stores was reviewed. It was anticipated that sufficient quantities of vaccines normally manufactured at the Central Research Institute, Kasauli, could be produced to meet any emergency but the supply of suitable glass ampoules at first gave rise to some anxiety. Prior to the war most of the ampoules used were of German origin. Reserve stocks equivalent to two years' average requirements were, however, held. The position nevertheless was such *that it was deemed advisable to seek an indigenous supply.* Samples were obtained from various sources and eventually ampoules made from neutral glass manufactured in Calcutta were found to pass the B.P. test for limit of alkalinity and to be in every other way suitable.

Following vaccines and sera were classified as essential:—

Sera

1. Anti Anthrax.
2. ,, Diphtheretic
3. ,, Dysenteric
4. ,, Gasgangrene
5. ,, Meningococcal
6. ,, Streptococcal
7. ,, Tetanic
8. ,, Venene
9. ,, Tetanus Tosid }
10. ,, Tuberculinum Pristinu } Added in November 1942.

Vaccines

1. T.A.B.
2. Cholera
3. Plague
4. Anti-rabic
5. Vaccinum Pertussis
6. Vaccine Lymph

Imported Sera

Just prior to the outbreak of the war orders were placed increasing the quantities imported by 50 per cent.

To meet additional requirements for sera on mobilisation a standing arrangement had been made between the Government of India and Messrs. Burroughs Welcome & Co. under which, in consideration of a fixed annual payment the firm undertook to maintain stocks of certain sera which would be available for despatch to India immediately on telegraphic demand to be followed at regular monthly intervals by further supplies. The sera included in the contract were:—

Tetanus antitoxin	500 A.W.
,, ,,	1,500 A.W.
,, ,,	8,000 A.W.
Diphtheria antitoxin	10,000 Units
Anti-dysentery serum	8,000 ,, (Shiga)
Anti-meningococcus serum	10 cc Conc=30 cc
Anti-streptococcus serum	10 cc
Anti-gasgangrene serum	4,000 units (welchii)

Immediately upon the declaration of the war the scheme was put into operation and consignments began to arrive in India in November 1939 and continued to arrive with fair regularity up to April 1941, although the period required for transit was naturally longer than was originally anticipated. By April 1940, stocks in hand were in excess of requirements and orders were accordingly cancelled for a period of six months. At the end of this period the order was not renewed but steps were taken to obtain supplies of sera from the Commonwealth Serum Laboratories, Melbourne, Australia, as it was considered there would be great saving of time in transport, which by utilising air services could be reckoned in terms of days instead of weeks.

In December 1940, fresh orders were placed in the United Kingdom for sera required for 133 U comprising the following:—

1.	Diphtheria antitoxin	3,192 tubes
2.	Tetanus antitoxin 500 A.U.	15,960 ,,
3.	,, ,, 1,500 A.U.	1,33,000 ,,
4.	,, ,, 10,000 A.U.	1,33,300 ,,
5.	Anti-dysentery serum	13,300 ,,
6.	Anti-gasgangrene serum	7,980 ,,
7.	Anti-meningococcus serum	1,596 ,,
8.	Anti-streptococcus serum	3,192 ,,

By the end of July 1941, no item of this order had been received in India nor had any intimation of despatch been received and stocks of anti-gasgangrene serum, tetanus antitoxin (10,000 A.U.) and anti-dysentery serum had already become completely exhausted by the end of June. The possibility of this eventuality had been foreseen and in October 1944, the Medical Stores Supply Committee had considered the possibility of manufacture of sera in a special wing of the Veterinary Institute at Mukteshwar, where veterinary sera were already being prepared in considerable quantities. The main anxiety following non-arrival of the December order was with regard to anti-tetanic serum (10,000 A.U.) stocks of which had become completely exhausted by the middle of March. The Director, Central Research Institute, Kasauli, had reported favourably to the Medical Stores Supply Committee upon the products of the Bengal Immunity Co., Calcutta and an order for 1,000 tubes of tetanus antitoxin (10,000 A.U.) was placed with that firm and delivered by the end of June. These proving satisfactory, further orders for tetanus antitoxin serum, anti-gasgangrene serum and anti-diphtheritic serum were placed in October 1941 and as it was apparent that this firm could supply satisfactory products, the proposal to prepare seras at the Veterinary Institute, Mukteshwar, was dropped.

Additional steps to correct the adverse stock position were the placing of a special telegraphic order for anti-dysentery serum (3,250 tons), anti-gasgangrene serum (4,000 units perfringens), (2,100 tubes) and tetanus antitoxin 8,000 A.U. (2,750 tubes) in the United Kingdom and its duplication in Australia. The bulk of the Australian order was received at the end of June 1941. The order on the United Kingdom was transferred to United States of America and on 28 June 1941, 3,250 tubes of anti-dysentery serum were received. These receipts relieved the immediate urgency but the serum situation as a whole remained serious. But by November imports had considerably improved and large quantities of sera had been received from the United Kingdom, U.S.A., the Union of South Africa and Australia. In addition the Central Research Institute, Kasauli, had itself prepared 1,151 tubes of diphtheria anti-toxin. 1,000 additional tubes of tetanus antitoxin and 342 tubes of anti-gasgangrene serum (4,000 units perfringens) had been delivered by Bengal Immunity Co.

The stock position was, therefore, much improved and thereafter supplies were received with sufficient regularity to ensure adequate supply. The magnitude of the task of meeting demands for sera from the Armed Forces is evident from the table on page 117.

U.K. MANUFACTURED VACCINES

The stocks of vaccines held in reserve at the outbreak of the war and subsequently manufactured at the Central Research Institute, Kasauli, proved adequate for the huge demands made upon them inclusive of those from Malaya and Iraq. The details are given in the table on page 117.

NEW INVENTIONS—IRON LUNGS, SULPHADRUGS, PYRETHRUM AND DDT PENICILLIN, PROTEIN HYDROLYSATES

The new inventions or improvements that came into existence during World War II may be summarised as follows:—

Iron Lungs

At first, four were supplied as a gift from Lord Nuffield. The number was increased later. These were used by the civil and military.

Pyrethrum and DDT

The U.S. authorities who controlled its import, allotted only a limited quantity for India restricting its use to military requirements or to those civil areas which might affect troops or to essential civil services directly connected with the war effort.

Issues of Sera and Tetanus Toxoid for Military Use (Ampoules, Doses or cc.)

Products	1 July 1939 to 31 Dec 1939	1940	1941	1942	1943	1944	1945
Diphtheria antitoxim 5,000/10,000 units, ampoules	1,393	4,558	7,111	15,181	13,374	18,417	64,909
Tetanus antitoxin 500 AU, ampoules	8,672	17,366	14,283	14,320	8,211	..	..
Tetanus antitoxin 15,00 AU, doses ..	14,743	25,192	65,146	1,91,195	3,27,134	2,97,425	6,05,266
Tetanus antitoxin 8,000/10,000 units, ampoules	208	2,737	4,318	10,392	12,260	10,004	2,092
Anti-streptococcus serum 10 cc ampoules	1,312	1,115	2,806	748	740	21	..
Anti-meningococcus serum ampoules	1,249	2,280	2,270	1,553	616	48	..
Anti-dysentery serum 8,000/25,000 Shiga units, ampoules ..	2,657	7,088	10,949	27,765	17,206	11,878	15,266
Anti-gasgangrene serum, ampoules ..	981	3,356	3,955	20,921	54,023	..	..
Anti-gasgangrene serum polyvalent prophylactic, doses	..	..	..	..	..	41,195	1,30,862
Anti-gasgangrene serum therapeutic, ampoules	..	..	..	..	..	21,758	9,735
Anti-anthrax serum, ampoules ..	..	..	..	..	..	1,204	1,630
Tetanus toxoid, cc	..	2,60,770	5,68,441	7,01,782	24,19,861	35,74,290	40,22,970

Issues of Major Products of Central Research Institute, Kasauli for Military Use

Product	1 July 1939 to 31 Dec 1939	1940	1941	1942	1943	Total of 4½ years
T.A.B. Vaccine ..	1,46,803 cc	4,99,480 cc	12,44,306 cc	19,07,167 cc	30,30,564 cc	68,28,320 cc
Cholera ,, ..	77,512 ,,	1,74,892 ,,	9,78,500 ,,	17,76,097 ,,	36,37,881 ,,	66,64,882 ,,
Anti-rabic vaccine ..	20,226 ,,	1,02,692 ,,	1,26,125 ,,	1,64,757 ,,	2,38,292 ,,	6,52,082 ,,
Antivenene ..	883 amps.	2,472 amps.	5,044 amps.	9,411 amps.	12,839 amps.	30,679amps.

Owing to the scarcity of kerosene oil required for the spraying of pyrethrum extract a formula for the preparation of an emulsifier to be used with the pyrethrum extract for spraying purposes was evolved in August 1943, by the Council of Industrial and Scientific Research. This formula was approved by the DMS. The manufacture of the emulsifier required by the DMS was undertaken at the MSD Factory, Madras.

DDT came in the field as an insecticide in 1944 and soon became available for the army in large quantities and in very restricted quantity for the civil. Even after the advent of DDT pyrethrum was for a time needed in large quantities as it was the essential ingredient of the repellent anti-mosquito cream as mentioned earlier.

Penicillin

This drug came in the field in 1943 and was only available for military use at first. In July 1944, the United States Government allotted a monthly quota of penicillin to certain exporting firms for the use of the civilian population in India. In order to ensure that this penicillin was equally distributed throughout the country and was available solely for the use of patients for whom its administration was indicated, in accordance with accepted practice which was a condition of supply laid down by the American authorities, the Government of India decided that the distribution of penicillin in India should be centrally controlled. They, therefore, established a Central Penicillin Control Board of five members under the chairmanship of the DGIMS.

This Board decided that distribution should be made through normal trade channels in the first instance, and accordingly licences to import penicillin were granted to seven importing firms under arrangements with the U.S.A. authorities.

As the supplies promised seemed likely to be small, it was originally decided to allot quotas only to the larger provinces and states for distribution to such approved institutions as they might select. These institutions were supplied on condition that they followed the recommendations of the Central Control Board regarding storage and use of the drug and they maintained records and submitted returns and clinical reports regarding the receipt and use of the penicillin supplied.

It soon became apparent that the monthly allocations from the U.S.A. were increasing, and were likely to continue to increase, and that if the distribution of penicillin were to be restricted to such institutions as the larger provinces and states might select, the amount of penicillin imported would be by no means completely absorbed. It, therefore, became necessary to devise a plan to enable a broader distribution to be made to medical practitioners for use in suitable cases. It was accordingly decided by the Central Penicillin Control Board that the penicillin stocks remaining with the importers after the Provincial governments had taken over their requirements should be issued to non-government institutions and private medical practitioners direct. It was made a condition that every order for penicillin should be accompanied by a certificate that the case for which the penicillin was required was in every way a suitable one for penicillin treatment signed by an Administrative Medical Officer or a member of a Board or Assessors appointed by the Government of India. Provincial Governments, Indian States etc., were requested to suggest names of doctors from teaching institutions to act as Assessors. Practitioners were also required to submit reports on the patients treated through the Assessors who signed the original permit, and the AMO or Residency Surgeon, to the Central Penicillin Control Board. In this way a close check was kept on the penicillin actually used, and it was ensured that as far as possible it was only used in suitable cases.

In addition to supplying practitioners and non-government institutions direct through the importers or their agents, it was intended that the original approved institutions should also serve as additional distributing centres, particularly in places where there was no representative of an importing firm, that is that they could sell penicillin to any practitioner who produced an Assessor's certificate. As in many instances members of the staff of such institutions were also Assessors, delay in distribution for urgent cases was reduced to a minimum.

Many enquiries were received by the Central Penicillin Control Board from the outset with regard to the known indications, methods of employment, and dosage of penicillin, indicating that the enquiries were out of touch with, or had no access to current medical literature. In order to assist in this direction, the Board, in September 1944, issued their Publication No. 1, a comprehensive memorandum on penicillin, its properties, methods of administration, indications, and contra-indications, including its use in particular types of wounds.

With a steady improvement in the production and supply position of penicillin it was felt towards the end of February 1945, that the necessity of central control over the distribution of the drug did no longer exist. The control was actually lifted with effect from 1 April 1945, and as a result of it the schemes of " approved assessors " and " approved institutions " also ceased to operate from that date. With effect from 1 May 1945, the export allocation system obtaining in the U.S.A. was also abolished. Under the new arrangements any importer in India could place orders for any quantity of penicillin on any firm in the U.S.A. provided the manufacturers undertook to supply the quantity demanded and the importer had been granted the necessary import licence by the CCI.

By co-operation of the military authorities a series of four courses of instructions for civil doctors was arranged at Secunderabad.

To supplement Publication No. 1, a second memorandum Publication No. 2 and " Bibliography on Penicillin " were published in March 1945.

Protein Hydrolysates

These were predigested proteins either in powder form for oral administration or in solution for intravenous use and were first used for cases of advanced stages of starvation in the Bengal Famine of 1943-44.

Protein hydrolysates for intravenous use were manufactured in the Bacteriological Department of the All-India Institute of Hygiene and Public Health on a large scale towards the end of 1943, and again in 1946 to meet the famine emergency. These were also manufactured in King Institute, Guindy, and the Haffkine Institute, Bombay, at a later stage.

CHAPTER V

Surgical Instruments and Appliances

With the progress of the war most of the medical and surgical instruments and appliances required for both civil and military uses and previously imported from abroad became difficult to obtain therefrom. It, therefore, became essential, in an endeavour to ensure an adequate supply of these articles, to increase very greatly indigenous production of these items. A large number of the simpler instruments were manufactured in India, but in many cases the requisite standard as regards quality had not been attained. Although there were six reputable instrument factories in India, it was, with a view to stimulate and improve them and at the same time to encourage others in order that the supply of the articles in question was available in adequate quantity, proposed early in 1941 to appoint an officer preferably a surgeon who after a preliminary training for a few weeks in metallurgy would tour India, inspect factories which made surgical instruments and appliances, ascertain quality and quantity of the work turned out by each, test the metal and temper of the various articles and decide what factories turned out satisfactory articles as also which of them be especially allocated the manufacture of definite appliances.

Apart from this " survey " work it was proposed that this Special Officer would regularly carry out that " concurrent " inspection of instruments and appliances which was found so necessary in ordnance work as opposed to the " terminal " inspection that often failed to reveal in the finished goods defects in manufacture only detectable in the process of making. It was also proposed that the officer appointed would be attached to the office of the DGIMS in the Medical Stores Department functioning as Director of Production, Instruments and Appliances— and that considerable amount of his time would be spent in touring. The first officer to the post was appointed in February 1941.

Immediately after the appointment of the Director of Production, Instruments and Appliances, the first steps to attain the ends necessitated by restriction of imports were taken in April 1941 when all aspects of the question of the supply of surgical instruments and appliances were discussed at a meeting of the Medical Stores Supply Committee and three broad lines of future procedure were agreed upon, namely:—

(1) to convene a committee of surgeons and others to undertake classification and standardisation of all items of surgical instruments and appliances which were judged to be essential,

(2) to try to get together for healthy co-operation representatives of the industry in India, and

(3) to enlist the help of the metallurgical experts of Messrs. Tatas and Sons for matters connected with the supply of suitable grade of steel for the manufacture of these instruments.

COMMITTEE ON THE STANDARDISATION OF INSTRUMENTS AND APPLIANCES

The first important subject for reorganisation of the surgical instrument industry was taken by the DGIMS in 1941, when a committee was convened of 23 members consisting of the leading surgeons in India representing all branches of Surgery, Dental Surgery and Veterinary Surgery. The DMS was also invited to appoint military specialists to the committee. The committee which was called " The Surgical Instrument Standardisation Committee " drew up schedules for all branches of Surgery for use in the army and in the civil and worked by means of sub-committees dealing with the following subjects: General Surgery and Ophthalmology, Oto-Rhino—Laryngology, Dental Surgery, Veterinary Surgery and Anaesthetics. The Committee compiled schedules of the various standard types of surgical instruments and appliances required for all branches of Surgery bearing in mind the following:—

" (i) The need for a minimum number of types consistent with efficiency, and

(ii) The desirability of selecting, as far as practicable, the types that could be manufactured in India and preferably the simpler and more easily manufactured types, in order to facilitate more rapid production. "

That there was ample scope for the Committee was indicated by the fact that Australia's list of essential instruments and appliances contained approximately half the number of items hitherto required by the armed forces. As an example of unnecessary and wasteful duplication there were no less than 16 patterns of artery forceps in the Indian priced vocabulary for general surgical use which were reduced to four types.

The Committee sat for four days in May 1941 and drew up schedules of instruments classified as:—

(a) Those considered essential.

(b) Those considered desirable to be supplied if and when the supply situation warranted their issue.

(c) Those considered essential for the complete performance of function by the military units and the civil.

In the case of (c) items it was considered that they would be required by only a few overseas military units.

In this way the number of patterns of instruments was reduced by no less than 300 under (a). Many new instruments of modern type were introduced to replace similar instruments of lesser efficiency. These schedules were accepted by the DMS who drew up fresh equipment scales for all units and a fresh vocabulary of medical stores was drawn up.

APPOINTMENT OF A TECHNICAL OFFICER-IN-CHARGE INSTRUMENT PRODUCTION

In 1941, the Director of Production, Surgical Instruments and Appliances was given a Technical Officer who had special knowledge of steel processes.

Revision of Provisioning System

The next step taken by the DGIMS was the reorganisation of the programme of surgical instrument production based on the provision policy of the DMS. The difficulties of ensuring adequate supplies to all users were not by any means solely confined to difficulties in the actual manufacture. The position was aggravated by the methods of provisioning and purchase in existence during the early stages of the war which made planned production almost impossible.

The first improvement to be made was in provisioning and this took place in October 1941, when the DMS took over responsibility for provisioning for the Armed Forces in India and adopted the MGO's method of provisioning and submitted bulk demands for delivery over a period of 18 months. The CPO also adopted long-term planning and the MGO's method of provisioning.

The next step was central planning of purchase which was obviously essential for the success of any system of central production. The policy of central purchase of medical stores in general had been decided upon as a principle in November 1941, but did not become operative until 1 January 1942. The Instruments Production Department, however, commenced in October 1941, the purchase of instruments, the orders being placed with selected manufacturers by the Medical Stores Depots. It was left to the Director of Production, Instruments and Appliances, to plan centrally as far as possible the purchase of articles, consolidated demands for which had been received subsequent to October 1941. To put this into effect tenders were called for and the sources of supply were decided upon by the Director of Production. Actual purchases were still effected by the Medical Stores Depots. When deliveries of the large quantities of stores thus ordered commenced in December 1941, inspection had to be ensured by the appointment of a Special Officer at the Medical Store Depot, Lahore Cantonment which was the chief receiving centre. This officer was assisted in his work by the Surgical Specialist, Lahore District. The Inspecting Directorate under the auspices of the MGO was not then established.

Further Development of the Industry

The adoption of forward provisioning and central purchase immediately led to a large expansion in the production of instruments. Manufacturers, under the stimulus of orders for a large number of instruments for delivery over a long period, were encouraged to expand their factories. Selected instruments were allotted to the firms best suited for such instruments and as far as was possible, subsequent orders for instruments were placed with the manufacturer who had proved satisfactory. The increased output of the industry was evident by the fact that during the months from December 1941 to April 1942, the average monthly output of such instruments as artery forceps, dissecting forceps, scalpels and scissors was 5,10,000.

A satisfactory standard of quality was ensured through having all tender samples approved and sealed by the DMS.

The stimulus of large orders also developed the production of suture, needles and rubber catheters. The output of the former at one period reached 60,000 packets monthly.

Serious difficulties in the manufacture of the surgical instruments were:—

(a) Lack of suitable heat treatment facilities
(b) Inadequate supplies of steel files
(c) Lack of milling machines and capstan lathes
(d) Lack of suitable supervision
(e) Poor nickel plating facilities
(f) Shortage of nickel plating material
(g) Shortage of grinding wheels and polishing material

As regards supervision, the Controller General of Inspection inaugurated later (early in 1943) a scheme for stage supervision, when control of instrument production was taken over by him.

PROVISION OF RAW MATERIALS—SUPPLY OF SUITABLE STEEL

Early in 1941, it was realised that there could be no long-term planning of instrument production until continuity of raw material supplies was ensured. An adequate supply of suitable steel was at first anticipated to be difficult and the difficulty was met in a rather unexpected way. It was found that large stocks of carbon steel of enemy origin were in the possession of the Custodian of Enemy Firms. These steel stocks were frozen and in 1941 certain sizes and types considered by the Technical Officer to be suitable for instrument production were taken over by the DGIMS and stocked in the Medical Store Depots at Calcutta and Bombay and used for instrument manufacture. These materials were issued to bonafide manufacturers as required against Government supply orders. To guard against possible future shortage of raw material, sources of indigenous carbon steel were investigated and steps taken to augment steel reserves by ordering 25 tons of carbon steel from an Indian manufacturer. Later in 1942, a central steel reserve was formed at Raipur Depot, stocks from other depots being transferred to this depot. These arrangements proved satisfactory.

INSPECTION OF INSTRUMENTS AND APPLIANCES

Inspection of instruments was performed at first by the DADG of the depots assisted in the case of Lahore and Bombay by the military surgical specialists. Owing to the undeveloped state of the industry the standard of quality demanded against inspection could not in the beginning be set at a high level. Stores had to be accepted provided they were considered serviceable by the surgeons.

In March 1942, inspection of surgical instruments and appliances was taken over by the Controller General of Inspection in the MGO Branch of Army Headquarters and this led to important changes. One of the first tasks undertaken was the preparation of a detailed specification and design for each instrument and appliance. The manufacturers experienced difficulties in manufacturing instruments to the new specifications. It was found that the number of instruments offered was greatly reduced and that, of those actually submitted for inspection, a large proportion had to be rejected as they did not come up to the standards set by the revised specifications. These matters reached a stage of what amounted to an impasse and it was evident that some kind of broad policy had to be decided upon and ultimately adopted. It was evident that either a large staff of skilled technicians should be posted to manufacturing centres to develop manufacturing facilities and supervise production, or else all high grade instruments should be imported. The alternatives were that the standards of specification should be lowered and that further attempts should be made to assist manufactures so that their products might reach the necessary standards. Ultimate action amounted to a compromise. At a meeting held in July 1942, between the representatives of the DGIMS, the DMS and the CGI, it was agreed that an attempt should be made to recruit suitable technicians in the United Kingdom and to post them to manufacturing centres to develop manufacturing facilities and supervise production.

Apart from the large rejections in the indigenously-produced instruments the fact remained that even instruments which were accepted after inspection proved in many instances to be useless for the purpose for which they were intended. For instance, an important administrative officer of the Indian Army Medical Services reported his own experience of having taken abroad during the war a thousand-bedded hospital which had instruments of indigenous production. Within a short time, he had to replace the entire stock of instruments by those of the United Kingdom manufacture as the former proved entirely uselses. In order to examine the problem from all angles and formulate suitable recommendations, a special committee on surgical instruments and appliances was constituted in November 1942. The committee consisted of the following members:—

Brigadier Grant Massie, Consultant Surgeon, India Command (*Chairman*).
Lt.-Col. M. M. Cruickshank, IMS.
Mr. R. N. Cooper, MS, FRCS.

The committee had to survey the whole range of items produced both in India and in the United Kingdom with a view to listing:—

(a) Those which should be supplied wholly by importing from the United Kingdom or elsewhere ex-India.
(b) Those which should be supplied wholly by manufacture locally.
(c) Those which could be manufactured in India by *specified firms*.
(d) Those falling under (a) and (c) the future manufacture of which or expansion of manufacture of which in India should be explored.

The suitability or otherwise of each item of Indian manufacture would be assessed solely from the point of view of whether or not the instrument, etc., was serviceable.

The committee had also to report on the nature and standards of inspection to be set.

The communications and reports presented to the committee were read and considered by them. The committee also obtained the views of a number of technical experts. Samples of both accepted and rejected instruments and appliances were examined.

In respect of surgical instruments, the committee understood the word "serviceable" to mean the performance of a proper function having regard to durability in the ordinary circumstances of wear and tear.

The committee considered all aspects of indenting and manufacture of instruments in the country and the import supply situation. The main features of its report were as follows:—

> *Existing Conditions of Manufacture:* The committee was of the opinion from the evidence before it that the manufacturers hitherto employed were unable and in fact had failed for various reasons inherent in the present organisation to supply the necessary quantity of instruments of requisite quality.

The following chief difficulties were noted:—

> (1) Lack of proper steel including stainless steel. (2) Lack of proper heat treatment. (3) Inefficient electroplating. (4) Lack of special industrial equipment. (5) Lack of technical supervision and stage inspection. (6) Lack of efficiently planned production.

The committee felt that there had been no organised attempt on a sufficiently large and comprehensive scale to give assistance to the manufacturers or to institute methods conducive to large-scale production.

The committee was satisfied that with care, patience and instruction, instruments of quality could be produced in small numbers as shown from certain samples which had been produced for its inspection.

The Import Supply Situation: The committee noted that the import supply situation was difficult and likely to remain so in the immediate future. The committee also noted the great delay in the delivery of imported articles and was aware that a period of fifteen to eighteen months was the usual time lag required for supplies to materialise from the United Kingdom.

The Urgency of Meeting Demands: The committee had been made aware of the critical situation regarding the supply of instruments, and for that reason it had thought fit to consider all possible ways and means for augmenting an indigenous supply of requisite serviceability.

SURVEY OF THE PVMS

With these considerations in mind the committee surveyed the range of relevant PVMS items produced both in India and the United Kingdom and listed them in accordance with the terms of reference.

In accordance with its terms of reference the committee surveyed the position under the following heads:

> List (a) "*Those which should be supplied wholly by importing from the U.K. or elsewhere ex-India*": This list included needles, syringes, endoscopic

and optical instruments, and in general, instruments requiring a degree of precision in manufacture which had not been attained in India.

List (b) "*Those which should be supplied wholly by manufacture locally*": The items in this list comprised the bulk of general surgical instruments. The committee wished it to be expressly understood that its allocation of these instruments to this list was made on the assumption that the recommendations with regard to manufacture made by the committee and detailed later, could and would be carried out.

The committee felt that if these recommendations could not be carried out, the then existing unsatisfactory state of manufacture left the committee with no alternative but to transfer these instruments to List (a).

List (c) "*Those which could be manufactured in India by specified firms*": The instruments in this list comprised approximately 20 per cent. of the total. In respect of the greater number of these instruments, only those made by a certain firm could be considered serviceable. Whether this particular firm could without assistance manufacture these instruments in the required quantity appeared doubtful, having regard to the slow production at that time. The committee was of opinion that unless the recommendations in respect of development and expansion were carried out, it was useless to consider other firms.

List (d) "*Those falling under (a) and (c) the future manufacture of which or expansion of manufacture of which in India should be explored*": The committee considered the possibilities of indigenous manufacture in every item under review and in those cases in which there was any possibility of manufacture in India this was indicated but the observations on the then existing state of manufacture made by the committee in respect of items in Lists (b) and (c) applied with special force to items in this list.

To correct the defects to which this report had made reference, the committee recommended as follows:—

(i) *Steel:* It was necessary that if instruments were to be made of steel according to specification, proper quality of steel must be forthcoming and the highest priority accorded. Furthermore, every effort should be made to obtain a supply of stainless steel appropriate to the purpose. This steel was essential for certain instruments, and its use in the manufacture of others would obviate the serious difficulties then attendant on plating.

(ii) *Heat Treatment:* This operation was ill-understood in India, and it had the greatest possible bearing on the serviceability of the final product. The committee drew serious attention to the necessity of development of this process. Need of establishment of proper plating centres was stressed.

(iii) *Industrial Equipment:* The evidence before the committee pointed to an absence or shortage of accurate standard gauges, finishing dies, files and other requisites, such as milling machines, used in the manufacture of hand-forged instruments. These essentials were requisite if large-scale production of serviceable instruments was to be attained.

(iv) *Technical Supervision and Stage Inspection:* The committee was concerned at the waste of labour and more especially at the waste of material which was taking place. That there was a considerable waste of steel appeared undoubted and the committee had been unable to determine what became of it.

The committee felt that there was in general a complacency and a lack of effort on the part of manufacturers who were satisfied to produce what they hoped would pass, rather than articles of quality which would bring them credit. There was ample evidence to show that manufacturers lacked appreciation of the necessity for uniformity and accuracy in production. The committee recommended that the CGI should institute stage inspection and afford proper supervision, encouragement and advice to manufacturers through competent and full-time technical officers working in close collaboration with the planning officers of the Supply Department. The committee attached the greatest possible importance to this supervision and stage inspection.

(v) *Planned Production:* The committee considered that there was an urgent need for efficient and co-ordinated planning of production.

Potential and hitherto untapped sources of supply such as engineering firms and Government factories used to precision work should be explored. The committee understood that the Central Government Workshops in Cawnpore had begun the repair of scientific and surgical instruments and their potentialities for manufacture and those of engineering firms in the Calcutta area appeared to be considerable and worthy of note and investigation. The committee felt that every endeavour should have been made to " nationalise " the industry, so that the efforts of firms be directed to the making of specific items.

The making of surgical instruments is a highly specialised industry and an output satisfactory both in quality and quantity was not to be expected by following methods and procedures which were haphazard, ineffectual, lacking in co-ordination and time-consuming.

The committee understood that in respect of a new industry established in war time, the usual practice was for the CGI to deal with initiation and development. When a firm had produced satisfactory samples, the matter of bulk production passed to the Supply Department which in close association with the CGI helped the manufacturer through the agency of planning officers. The committee understood that in cases of special difficulty it was the practice of the Supply Department to help firms in respect of money, equipment, raw material, labour and transport.

In order to expand the industry, there should be a substantial and vigorous drive in competent technical hands. This implied the provision of technicians who knew how instruments were made and what instruments looked like at various stages in their manufacture.

Both in respect of planning of production, technical supervision and stage inspection, it was clear that a number and probably a large number of experts of a varying degree of skill and experience would be required for the attainment of satisfactory output. It was probable that the resources of India in respect of these experts were limited and the committee felt that in view of their paramount importance every endeavour should be made to secure their services from the U.K. or elsewhere. The committee observed that at the meeting convened by the CGI on 25 July 1942 specific suggestions were made in respect of the appointment of an industrial planning officer and a suitable technician. In the committee's opinion a great deal more than the mere provision of two experts was required to solve the then existing difficulties and place the provision of surgical equipment on a sound basis.

The committee observed with great concern the delays attendant on the then existing procedures of supply and desired to record its opinion that no improvement could follow unless the recommendations which they had made were implemented not only singly, but as a whole.

The fulfilment of these recommendations required in the committee's opinion a reorganisation of industrial and supply methods and without that reorganisation the requisite instruments in proper quantity were unlikely to be forthcoming in India.

NATURE AND STANDARDS OF INSPECTION

The committee was satisfied that the standards of inspection were fit and proper, and that the rejections were made on adequate grounds. In respect of 540 out of the total of 580 instruments rejected at Lahore in October 1942 there was complete agreement amongst the four officers then present. Only in respect of 40 instruments rejected was there any dispute and only one officer of the four present thought that these should have been accepted. Even had these 40 instruments in dispute been accepted, the total percentage of rejections would still have been as high as 78 per cent.

The committee was convinced that these figures were a true indication of the industry's capacity to produce serviceable instruments at that time. The committee desired expressly to draw attention to these figures for the reason that in the note on surgical instrument production in India written by the DGIMS the rejections were described as having dropped to 5 per cent. If this figure related as was presumed, to a period of some 12 months back and if the standards of inspection were then adequate and proper, the committee could only conclude that there had since taken place a phenomenal deterioration in the quality of manufacture.

The committee read the proceedings of the seventh meeting of the Medical Stores Supply Committee and was of opinion that the paragraph relating to instruments and appliances presented in general a misleading picture of the then existing conditions. Further the impression presented to the committee was that the instruments on the indigenous list were in satisfactory production, and the committee found that this was not the case.

The committee was of the opinion that surgical instruments were in the main instruments of precision and strongly deprecated the view that accuracy and a high standard of workmanship were not of fundamental importance. The parts of an instrument could not be apportioned as essential and non-essential; the parts make the whole and in respect of serviceability they were inseparable.

The committee had taken particular pains to ascertain from the engineering experts who appeared before it their view on engineering tolerances and the committee was satisfied that accuracy was perfectly compatible with hand methods of manufacture, and that wide deviations from specifications were not encountered even in such common articles of trade supply, as screw drivers, hammers and table knives supplied by firms of repute.

The committee found it difficult to understand how the introduction and provision of blue prints which were aids rather than hindrances had in any way increased the difficulty of manufacture.

The committee was informed by all the engineering and technical experts who appeared before it that the term " war finish " was one that related to the decorative qualities of an article and that as applied to the manufacture of surgical instruments it was without precise meaning and was misleading in that it inferred that a high standard of finish was not necessary. On the contrary the committee found that a high standard of finish was necessary.

The committee recommended that inspection be extended to the earlier stages of manufacture.

As to the standards of inspection the committee recommended that they should be such as to ensure:—

(1) A high quality of material, temper and plating, a proper finish and good workmanship.
(2) Uniformity of shape and dimension in accordance with the specifications.
(3) The exact reproduction of important details of shape and size.
(4) Functional efficiency as described in the specifications.

Although the properties of an instrument and the manner of its testing were laid down in the specification it appeared that insufficient attention was given to these matters by the manufacturers. To give practical guidance to the Inspector the committee in its review of the PVMS noted the features of importance in each instrument.

The committee had indicated precisely the parts of an instrument which in respect of dimensions were important to the surgeon. These parts should be manufactured to recognised engineering fits and all other parts manufactured within tolerance commonly accepted in engineering practice and suited to the manufacturing operation concerned. In future tolerances should be indicated on the blue prints and where tolerances were not shown dimensions should be reproduced as closely to the specification as was possible. The manufacturer was to be made aware that the dimensions on the blue print were the basic dimensions on which tolerances had been calculated and would be allowed. The dimensions of the approved tender sample was not to be used as a basis for calculating tolerances.

Tolerances in respect of weight should be approximately plus or minus 10 per cent. and the CGI should lay down a scale of tolerances in respect of spring loads for forceps.

Instruments with interchangeable and reciprocal parts and components must be absolutely accurate in their fits and dimensions. The

Assistant Inspector of Medical Stores should himself review all rejections made in respect of incorrect dimensions.

In its review of the PVMS the committee noted that satisfactory sealed patterns or complete specifications were not available in all cases. The CGI should provide the sealed patterns required without any further delay and he should be given every facility to obtain them from the Army Medical Stores and other sources.

In all findings and recommendations the committee was unanimous.

The recommendations of the committee were accepted by the Adjutant General in India in consultation with the DMS, the DGIMS and the Supply Department.

There were certain instruments the manufacture of which could be continued in India as was recommended by the committee or those the manufacture of which could be extended. Their manufacture largely depended on the carrying out of the recommendations stated above. Whatever the position, it was considered that there was bound to be a time lag before the local industry was reorganised and it was stated that an interim order should be placed at once on the United Kingdom for all items which were recommended by the committee to be obtained from the United Kingdom and also such items which could be produced by expansion of manufacture in India, only to the extent of covering the lag period. It was also decided that the final standards to be accepted were those laid down in the report.

It was recognised that some discretion was necessary during the interim period, whilst manufacturers were being educated to produce articles up to the standard laid down in the report.

As regards the responsibility for technical development, it was decided that this should be undertaken by the Department of Supply. In this connection the CGI and his staff were to give every possible assistance both by advice and instruction. Medical Adviser to the Secretary of State for India was fully informed about the situation and further requirements.

It was considered essential, if India's surgical instrument industry was to become a reliable source of supply that experts with first-rate knowledge of the processes of manufacture of surgical instruments should be flown to India immediately to advise on the possibility of India being able in reasonable time to produce satisfactory surgical instruments. If it was established, after the necessary improvements in production technique, that continued efforts to produce a wide range of satisfactory instruments were justified, the services of certain experts from London would be invaluable to India and the U.K. in assessing the extent to which Indian industry could relieve the U.K. of her commitments. If the services of such experts could be obtained, India was willing to pay them suitably with air passage both ways. The length of stay was provisionally estimated at six months.

He was further informed that an alternative to obtaining really expert advice on surgical instrument production in India would be the complete transfer of most of India's requirements from indigenous to the imported list. It was also suggested that if an expert came he should bring with him, without delaying his departure, blue-prints and specifications of sample machines needed in instrument manufacture, so that India could take steps if so advised, to produce them. Meanwhile, India was doing what she could to improve standards. The expert in question was required in addition to an industrial planning officer who was already asked for in November 1942. The intention was that this latter officer should accompany the expert in his inspections and be trained by him to carry on supervision of production methods.

APPOINTMENT OF A CONTROL OFFICER OF SURGICAL INSTRUMENTS DEVELOPMENT

The recruitment of suitable technicians from the United Kingdom during the war proved to be very difficult. Until such personnel were forthcoming from the United Kingdom it was decided that the best technical experts available in India should examine the matter. Mr. Martin, Director of Civil Armament Production, accompanied by the technical experts of the DGIMS and the CGI inspected the centres of production of surgical instruments in the Punjab in January 1943. Certain firms were selected in connection with the development of surgical instrument production. It was decided that the responsibility for development of the surgical instrument industry be assumed by the CGI. Following this decision a control officer of surgical instruments development and a staff of technicians were appointed in February 1943, by the CGI.

This staff was posted to Sialkot, Lahore and Bombay. Under the guidance of this staff the necessary organisation for the production of larger quantities of surgical instruments in accordance with the recommendations of the committee and with the new specifications was developed and production on a large scale was commenced again in June 1943. During the subsequent months the production figure of 1,30,000 instruments per month was quickly reached, a scale which was considered adequate to meet demands from all sources.

In July 1943, the responsibility of production and supply of surgical instruments was taken over from the DGIMS by the Supply Department. A comprehensive note by Mr. E. T. Ibbitt, Deputy Director of Planning, on the history of the planning, development and production of surgical instruments and appliances, miscellaneous medical stores and medical containers in India since the commencement of the war is given under Appendix XI.

CHAPTER VI

Economy and Control Measures during the War

Economy in the Use of Drugs: The first step taken by the Director General, Indian Medical Services to meet the position created by the war in the supply of drugs was the appointment of a departmental committee to investigate the sources of supply of drugs, chemicals and biological products, the use of suitable substitutes and other measures of economy during the war. For economy in the use of drugs, a list of imported drugs which were difficult to obtain in large quantities was prepared.

This list was circulated to all hospitals, civil and military, with the recommendation that these drugs should be used most sparingly and that substitutes more readily available be used. A list of items which could be made in hospitals with considerable saving in packing and freight was also given.

Tinctures were issued in a concentrated form. Although this was definitely an economy measure, there was the danger of theft of potable spirit. If a more dilute alcohol than was prescribed in the British Pharmacopoeia was added to a concentrated tincture, all the active principles of the concentrated tincture would not go into solution and in certain cases there was the danger of potent drugs being precipitated and accumulated at the bottom of the bottle. Distilled water was required to be added to the spiritus rectificatus to make up the alcohol necessary for dilution of the concentrated tincture to B.P. strength. There could be thus no saving in freight if this distilled water was also issued by depots. The saving in freight could only be realised if the distilled water was made in hospitals.

Depots were required to stock tinctures of B.P. concentration besides the concentrated tinctures referred to above. A list of tinctures which could be issued by depots in concentrated form was given in the report.

A memorandum on economy in the use of drugs in war time issued by the Medical Research Council, London, was brought to the notice of all concerned in June 1941. In this memorandum drugs were divided into three classes:—

(a) Drugs which were then either regarded as essential, or readily available.

(b) Drugs which were essential for certain purposes but not for others, and in the use of which strict economy should be observed.

(c) Drugs which were not essential and did not justify importation or manufacture in war time.

The necessity for restricting the use of imported essential drugs was impressed on all medical officers both civil and military, as after the exhaustion of the then existing stocks, it was possible that no more would be obtained during the period of the war.

A list of imported essential drugs was published in June 1940. It was found necessary to revise this list of essential drugs as the war progressed, as new items such as certain of the sulpha drugs became more popular. Revised lists of essential drugs were issued in 1941 and again in 1942. A list of medical and veterinary essential drugs and certain hospital chemicals was prepared in 1942 and circulated to all civil and military hospitals.

In the various measures adopted in India to effect economy in the use of drugs in war time, particularly in the revision of essential list and in the use of substitutes, valuable aid was afforded to the Government of India by the therapeutic requirements committee of the Medical Research Council in the United Kingdom whose War Memorandum No. 3 on "Economy in the use of Drugs in War time" was published in 1941. In February 1943 a circular on economy in the use of drugs and other medical stores in war time was published which was to the following effect.

ECONOMY IN THE USE OF DRUGS AND OTHER MEDICAL STORES IN WAR TIME

War conditions made it imperative to exercise the strictest economy in prescribing. Even if the drugs themselves were readily available, their packing and distribution, often under difficult conditions, made demands on materials, manpower and transport which could be justified only if the drugs were required for essential medical purposes. Many important substances were available for medicinal use only in limited amounts. They were more urgently required for other branches of the nation's war effort. In these cases special care was required to ensure that their consumption was reudced to the lowest level. The following notes indicate the drugs in the use of which economy was necessary and make certain suggestions for their replacement where applicable by other drugs of which supplies were more plentiful.

Agar: Agar should be reserved for bacteriological purposes. Preparations containing agar should not be prescribed. If any drug is required for the same effect as agar, ispaghula or the dried ripe seeds of plantage ovata may be used.

Alcohol: Economy was essential. As a substitute for alcohol used in the nursing of recumbent patients the following lotion was recommended:—

Zinc sulphate	17½ grains
Solution of Bordeaux B. (B.P.C.) ..	20 minims.
Water	to 4 fluid ounces

The lotion may be used undiluted or mixed with an equal volume of water. When there is cutaneous erythema, a five per cent. solution of silver nitrate in distilled water is recommended instead of Lotio Zinci Sulphatis.

For preserving surgical instruments and suture needles in a sterile condition and free from rust, the following solution may be used in place of alcohol:—

Liquor Boracis at Formaldehydi

Borax	131 grains
Solution of Formaldehyde	4 fluid drachms
Phenol	35 grains
Water	to 1 pint

This solution should not be used for hypodermic needles and syringes.

Except in medicines for children, or where the measuring of minute quantities may prove difficult tinctures should be replaced whenever possible by suitable liquid extracts, e.g.:—

Tinctura Belladonnae by	Extract Belladonnae Liquidum B.P. ½ Min. Extract=12½ minims. of tincture
Tinctura Nucis by Vomica by	Extract Nucis Vomicae Liquidum B.P. ½ Min. Extract=6 minims. of tincture

The essential ingredient in Tinctura Opii Camphorata is Tinctura Opii. There is no reason why the simple tinctura should not be used wherever possible, in suitably adjusted dosage. Ear Drops-Rectified Spirit should be replaced by Spiritus Methylatus Industrialis.

Acid Boric: Except for eye conditions, boric acid lotion should be replaced by normal saline. " Boric acid in lint is wasted. " (Medical Research Council Memorandum No. 3).

Acid Citric: All supplies of this Acid are imported and should be replaced, where possible, by sulphuric acid or by a natural lime juice.

Bismuth: Bismuth and its salts should be reserved for the treatment of syphilis and of tropical diseases. In lieu of Bismuth salts for use in gastro-intestinal conditions, the following substances, alone or in suitable combination, should be selected:—

Magnesium Trisilicate; Magnesium Carbonate; Magnesium Oxide; Kaolin.

Cascara Sagrada: This drug is only obtainable in America and should not be prescribed. There are many vegetable laxative drugs indigenous to India, such as, sennae folium or fructus, figs and tamarind.

Cinchona and Quinine: The use of cinchona as a bitter should be discouraged. Chirata, Nux Vomica and Gentian preparations may replace quinine as a tonic or bitter. Quinine should be reserved for the treatment of malaria. Any quinine salt or tablets of quinine salts which have become disclosured and are considered unfit for use, should be sent to the Medical Store Depot, Madras or Bombay, for the quinine to be extracted and re-made into a quinine salt.

Cocainae Hydrochloridum: Owing to the difficulty in obtaining supplies of this drug it is imperative that stocks should be conserved to the utmost possible extent.

Cod Liver Oil: Oleum Vitaminatum, B.P. has the same vitamin content as high grade cod liver oil, and is a satisfactory alternative in most cases.

Dextrose: Dextrose and Glucose are rarely necessary except for intravenous and rectal administration.

Digitalis: Except in the rarest circumstances digitalis is best prescribed in the form of tabella digitalis pulveratae.

Distilled Water: Economy in fuel and transport can be effected by restricting the use of distilled water to:— (1) Preparations for application to the eye, and (2) Preparations where, in the opinion of the dispensing pharmacist, the use of ordinary potable water would result in an undesirable alteration in the medicament prescribed.

Emetine Hydrochloride: Emetine hydrochloride is one of the scarce drugs. The main value of emetine is in the prevention of liver abscesses in patients with amoebic dysentery. In many cases the treatment with emetine is continued up to 12 doses which was considered unnecessary. A course of 6 doses should be given at first and then other treatments tried for a time. In a case of liver abscess or hepatitis, it may be necessary later to repeat the emetine treatment, but this should seldom be done before a lapse of three or four weeks.

Ergot: Liquid extract of ergot is not an economical or satisfactory preparation. Ergot is best administered in the form of tabella or capsule or ergota praeparata.

Flavouring Agents: In the majority of cases, chloroform water can replace the usual medicated waters.

Glycerine: Every ounce of glycerine saved means more for explosives. Glycerine should not be used as a flavour, as a substitute for syrup, as an ingredient in mixtures, or in enemas. In war time, the use of compound glycerine of thymol should cease. Glycerine paints for local application should be ordered in the smallest possible quantities (e.g., drachms instead of ounces). Mel depuratum may well be substituted for glycerine in paints.

Ipecacuanha: Supplies come from South America and all available ipecacuanha is required for the manufacture of emetine. Pulvis ipecacuanhae at Opii (Dover's powder) should be replaced by tabella acidi acetylsalicylici 3 gr., phenacetin 2 gr., opium ½ gr., pulvis ipecacuanhae may be replaced by ammonii carbonas. Tinctura ipecacuanhae and vinum ipecacuanhae may be replaced by tinctura senegae.

Liniments: For massage and other purposes where an emollient is required Arachis oil can be used in most cases.

Liquor Iodi Mitis: Wherever possible, this antiseptic should be replaced by liquor trinitrophenolis which is produced in India. Iodum had to be imported and supplies were limited.

Liver Extracts: Liver extracts which are suitable for parenteral use should be preferred. Oral use of liver extracts is of doubtful value. Liver extracts should only be administered to persons suffering from pernicious anaemia or other megalocytic anaemia.

Malt Extract: Malt extract and its preparations should be reserved exclusively for children or for patients suffering from tuberculosis.

Mercury: Is largely used in the manufacture of detonating agents in war time, and mercury and all its salts must be conserved to the utmost. Calmmel should be replaced by vegetable laxatives and hydrargyri perchloridum by acriflavina and other aniline disinfectants.

Paraffin Liquid: Strictest economy should be exercised in the use of liquid paraffin and preparations containing it. Where oral administration is considered necessary some economy can be effected by prescribing emulsion of liquid paraffin, but this too should be used sparingly. The use of liquid paraffin as a laxative had grown to enormous proportions and it occupied valuable space in ships coming to India. Liquid paraffin as laxative should be reserved for cases in which other purgatives are contra-indicated.

Paraffin Molle: In most cases paraffin molle may be replaced by deodorised hydrogenated vegetable oil of which India can produce very large quantities.

Phenol and its Derivatives: Phenol is an important chemical in the manufacture of plastics used in aircraft production and other industries. Saving of phenol and of drugs derived from phenol means more plastics for armaments.

Codeine and Caffeine: Compounds of aspirin with codeine or caffeine should not be prescribed as a routine; these preparations should be reserved for circumstances where aspirin alone will not suffice.

Phosphorous Compounds, including Phosphates Hypophosphites and Glycerophosphates: Preparations containing hypophosphites and glycerophosphates should be discarded. Sodium phosphate should not be used as a laxative. Sodium acid phosphate should only be used in association with hexamine. Phosphoric acid should be replaced by hydrochloric acid.

Potassium Compounds: Sodium compounds should be prescribed wherever possible as potassium salts were scarce.

Poultices: Cataplasma kaolini, which contains a large amount of glycerine, should be reserved for circumstances where ordinary domestic poultices, such as those made with linseed and starch are undesirable.

Sulphonamides: In the majority of cases requiring sulphonamide therapy, sulphanilamide gives excellent results. Other derivatives, such as sulphapyridine and sulphathiazole should be prescribed only where there are specific indications for their use.

General: Particular economy should be exercised in the use, and prescribing of the following drugs, and preparations containing them:—

1. Quinine salts
2. Atropine sulphate
3. Citric acid and citrates
4. Cocaine hydrochloride
5. Hyoscine hydrobromide
6. Menthol

7. Mercury and its compounds
8. Phenol and its derivatives, especially acidum salicylicum, sodii salicylas, acidum acetyl salicylicum (Aspirin), methylis salicylas, phenacetinum and phenolphthalein

CONTROL OF DRUGS IN SHORT SUPPLY

On the commencement of the war attention of all medical officers was particularly drawn to the following drugs in short supply and also to an article published by the Medical Research Council on the conservation of drugs as reported in the Lancet dated 6 April 1940.

Mercurials: The price of mercury and of its preparations had increased enormously after the outbreak of the war. Large amounts of calomel were prescribed in India, where vegetable drugs such as podophylli resin or pulvis jalapae compound would equally suffice. Hydrarg. perchloridum was a dangerous drug to handle and very corrosive and could be largely replaced by chlorosol which was non-irritant and cheaper.

Sulphonamides: Sulphapyridine (Dagenan or M and B 693) was much more expensive than Sulphanilamide. Sulphapyridine was justified in the treatment of pneumococal and gonococcal infections but not in streptococcol infections.

Bismuth Salts: Bismuth salts were very expensive and used in enormous quantities in alkaline powders and mixtures but their therapeutic value was doubtful. In the treatment of duodenal ulcer, various combinations of calcii carbonas, sodii bicarbonas, kaolin and magnesii carbonas were used. The following substitutes were suggested:—

A.	Calciie Carbonas	1 part
	Magnesii Carbonas Pond	1 part
	Sodii Bicarbonas	1 part
	Kaolin	1 part
B.	Kaolin	1 part
	Magnesii Carbonas Pond	1 part
	Sodii Bicarbonas	2 parts
C.	Magnesii Carbonas Pond	8 parts
	Sodii Bicarbonas	3 parts
	Calcii Carbonas	12 parts
D.	Kaolin	3 parts
	Magnesii Carbonas Pond	6 parts
	Calcii Carbonas	12 parts

Olive Oil: Olive oil was expensive and came from foreign countries. Oleum arachis which was indigenous was a satisfactory substitute in most preparations and was cheap and readily obtainable in India.

Bitters: Tincture or infusion of chirata which grew in India was recommended to be used in place of calumba and quassia which were imported.

Liquid Paraffin: The price of this drug had increased very much and was to be replaced as far as possible by senna, glaubers salts, etc.

Iodine and Potassium Iodide: Both of these drugs came from non-U.K. sources and were consequently much more expensive. Liquor iodimitis could be largely replaced by chlorosol which was much cheaper and in many circumstances more effective and much less irritating.

Ergot: The price of this drug had increased eightfold since the commencement of the war owing to the failure of the Spanish crop and owing to the fact that other sources were under Axis control.

Shortage of Ipecacuanha

Owing to the extreme shortage of ipecacuanha and the existing high rate of Rs. 20/- per lb. it was decided to retain the then existing stocks of ipecacuanha for the manufacture of emetine hydrochloride.

Substitutes were to be issued as follows:—

Item	*Substitute*
Tinctura Ipecacuanha Vinum Ipecacuanha	Tinctura Senega
Tablets Pulvis Ipecacuanha 5 grains	Tablets Ammonii Carbonas 5 grains
Ipecacuanha et Opii 5 grains	Acid Acetylsalicylisum 3 grains Phenacetin 2 grains Opii ½ grain

No further issues of Pulvis Ipecacuanha or its preparations were to take place.

The following preparations of Kurchi Bark were inserted into the Priced Vocabulary of Medical Stores as follows:—

Old PV No. 173-01	Kurchi Bismuth Iodide
Old PV No. 128-01	Extractum Kurchi Liquidum
Old PV No. 431-01	Tablets Pulvis Kurchi 5 grains

Medical Officers were requested to replace emetine hydrochloride, in the treatment of amoebic dysentery as far as possible, by these preparations of Kurchi.

ESSENTIAL IMPORTED DRUGS IN SHORT SUPPLY

As there were essential imported drugs the supplies of which, as the war developed, were likely to be curtailed or cut off, a circular was issued in June 1940 to all Medical Officers that it was imperative that they should exercise the strictest control over stocks under their charge in order to conserve them as much as possible. Alternative preparations of indigenous origin were to be used wherever possible.

Copies of the June 1940 list of essential imported drugs were also circulated. This list which has been referred to already was starred according to importance, three starred drugs being most essential.

In December 1940, attention of all administrative medical officers was directed to the list of imported essential drugs and to the necessity of exercising the greatest care over their use. India was entirely dependent upon import of these drugs from abroad and in war time this was difficult and costly.

Use of Kurchi in lieu of Ipecacuanha and Emetine: A note on the use of Kurchi and its preparations written by Colonel Ram Nath Chopra, C.I.E., I.M.S., (Retd.), Director of Biochemical Standardisation Laboratory, Calcutta, was circulated to all administrative medical officers in August 1940.

Economy in the use of Drugs: Prolonged use of ergot in normal women after delivery was discouraged and the utility of defatted powder was emphasised. Liquid paraffin being mainly manufactured in the U.S.A. its purchase involved dollar exchange which had to be conserved. It was to be replaced by indigenous drugs such as oleum ricini, rhubarb, senna, etc.

Strict economy was insisted upon in the use of atebrin and plasmoquine as there was a scarcity of these drugs or their substitutes in India by the end of 1940. It was anticipated that it would take some time before sufficient supplies of these drugs were received from abroad. Cocaine hydrochloride was imported in crude state from South America to the U.K. where it was refined and despatched overseas. The purchase of cocaine involved, therefore, much foreign exchange and shipping space. Stocks in hand needed conservation.

DECEMBER 1940 LIST OF ESSENTIAL IMPORTED DRUGS

Acidum acetylsalicylicum
,, boricum
,, salicylicum
Acriflavina
Ammonii carbonas
Argentoproteinum
Atebrin (Mepacrine Hydrochloride)
Atropinae sulphas
Barbitonum soluble
Bismuthi carbonas
Brilliant green
Calx chlorinata
Camphora
Chrysarobinum
Cocainae hydrochloridum
Creosotum
Dextrosum
Emetinae hydrochloridum
Ephedrinae hydrochloridum
Ergota praeparata
Glucosum liquidum
Hexamina
Hexobarbitone soluble (Evipan Sodium)
Homatropinae hydrobromidum
Hydrargyrum ammoniatum
Hydrargyri oxidum flavum
Hydrargyri Perchloridi
,, subchloridum
Hyoscinae hydrobromidum
Insulinum
Iodum
Ipecacuanha
Liquor formaldehydi
Menthol
Mersalyl
Naganol or British equivalent Antrypol (B.D.H.)
Neoarsphenamina
Paraffinum liquidum
,, molle (Flavum)
Paraldehydum
Percaine
Phenacetinum
Phenobarbitonum solubile
Physostigminae salicylas
Plasmoquine (Pamaquin)
Potassii bromidum
,, iodidum

Procainae hydrochloridum
Sodii bicarbonas
Sodii salicylas
Sulpharsphenamina
Sulphonamide preparations (e.g., Sulphanilamide, Soluseptasine, M. and B. 693, etc.)
Sulphur
Thyroideum
Unreastibamine

Communications were also issued to the medical press on the subject. In February 1944, the DGIMS published and circulated to all concerned a list of drugs in short supply with the request that the expenditure of such drugs should be closely watched.

The Medical Directorate, General Headquarters India also issued from time to time commencing from 1943 lists of articles in short supply, the expenditure of which was to be strictly controlled. These lists were " lists of controlled articles" which had to be frequently revised according to the supply position.

Strict economy in use of bottles was impressed upon all military and civil hospitals, and arrangements were made for the return of following types of medical stores especially from large hospitals.

(a) N. M. Stoppered
(b) N. M. Unstoppered
(c) W. M. Stoppered
(d) W. M. Unstoppered
(e) Poison and amber coloured bottles
(f) Tins: Non-greasy
(g) Drums: G.I. electrically welded greasy and non-greasy

ECONOMY IN ALCOHOL

Owing to the imperative need for saving alcohol during the war, it was decided that (i) liquor trinitrophenolis and liquor saponis aetherens would not be supplied and (ii) the following tinctures would be supplied in a concentrated form. The supply of these tinctures in a concentrated form was authorised in Addendum 5 to the B.P.

Tincture Cardamonii Composita B.P.
Tincture Gentianae Composita B.P.
Tincture Opii Campahorata B.P.

A special label, as shown below was used in supplying the above in a concentrated form.

TINCT................................CONCENTRATA
B.P. (Addend. No. 5)
Dose: Min. to Min.
THIS PREPARATION IS............TIMES THE
STRENGTH OF TINCT.......................

The supply of tincture ferri perchloridi B.P. would be discontinued and liquor ferri perchlor B.P. would be supplied in lieu.

Infusum chiratae conc. B.P.C. would be supplied in lieu of tincture chiratae.

Liquor ammoniae aromaticus B.P.C. in lieu of spiritus ammoniae aromaticus.

Linimentum camphorae B.P. in lieu of linimentum camphorae ammoniatum B.P.

By these changes nearly 80 per cent. of the alcohol used till then for the manufacture of the above preparations was saved.

With a view to ensuring that adequate supplies of all drugs and chemicals necessary for medical treatment and associated laboratory work, continued to be available in India during war time it was considered necessary to collect all available information regarding stocks held in the country and a Government of India notification was issued as follows:—

NOTICE—JULY, 1940

" ESSENTIAL, DRUGS "

" Though at present there is no shortage, the importance in existing circumstances of ensuring the maintenance of adequate stocks of essential drugs in India will nowhere be denied. Government are prepared to take such steps as are open to them to secure additional supplies in cases of proved necessity,—that is in cases, after due allowance has been made for stocks in hand and probable additions through the normal channels of trade, there is reason to apprehend a shortage. The first step must be the collection of full information regarding stocks already in the country.

" All importers and dealers (wholesale or retail) are accordingly requested to make to the officers named below, a return of the stock held by them of any of the drugs mentioned in the subjoined list. Stocks of any drugs which fall short of the quantities specified in the list need not be declared but where the stock of a particular drug exceeds the quantity specified, the whole stock of that drug and not merely the excess, should be declared.

" All returns will be treated as confidential. The first return will be in respect of stocks held on the 20th July 1940, and this return should be in the hands of the officers named below by the 27th July at the latest. Stocks in hand on the 20th August 1940, and on the 20th day of each subsequent month should be similarly declared by the 27th day of the month to which the return relates.

"Importers and dealers are also requested to maintain a record of all sales of the drugs specified in the list.

" In the belief that the importance of making full and prompt returns will be appreciated, the ready co-operation of all concerned is confidently invited.

" Returns should be made to the following officers, according to the area in which the stock is situated.

By dealers in	*Returns should be made to*
Madras Presidency, Central Provinces and Berar.	The Deputy Assistant Director General (Medical Stores), *Madras.*
Bombay Presidency and Sind.	The Deputy Assistant Director General (Medical Stores), *Bombay.*
Bengal Presidency, Bihar, Orissa and Assam.	The Deputy Assistant Director General (Medical Stores), *Calcutta.*
United Provinces, Punjab and N.W.F.P.	The Deputy Assistant Director General (Medical Stores), *Lahore.* "

The response to this request for voluntary returns proved poor and inadequate as shown below:—

Month 1940	*No. of Stockists in the approved list*	*No. of Stockists who replied*
August	518	286
September	517	133
October	517	153
November	517	131

In view of this poor and declining response, declaration of stocks was made compulsory under the Defence of India Rules. An ordinance was introduced for the duration of the war as the "Essential Drugs (Census) Order 1941." Since the promulgation of this ordinance there was a gradual increase in the number of declarations.

To prevent territories of the Indian States from becoming "holding places" of essential drugs it was decided that the States Government should be asked to extend the provisions of the ordinance to their States. Most of the States fell in line with the rest of India in this respect.

In addition to the submission of regular monthly returns of essential drugs, the dealers were further required to maintain records of sales and purchases of the essential drugs. The Essential Drugs (Census) Order further provided for the appointment of officers by both the Central and the Provincial Governments for the purpose of occasional inspection of the premises and records of dealers with a view to verify the correctness of the returns made or the records maintained under this order.

The experience gained from the working of this order necessitated the introduction of the following changes:—

Seizure of Undeclared Stocks

The Essential Drugs (Census) Order was suitably modified to conform to the provision of the amended Rule 81 of the Defence of India Regulations. The amended order provided for the seizure by officers appointed for this purpose of stocks of drugs in respect of which contravention of the order had been, was being, or was about to be committed.

The DADG (MS) Madras, Bombay, Calcutta, Lahore Cantonment and Raipur were authorised to exercise the new powers. The Provincial Governments took steps in 1942 to appoint some more officers for the enforcement of the order.

QUININE AND ANTI-MALARIAL DRUGS

Malaria being the most important public health problem in India the production and procurement of drugs necessary for the prevention and treatment of this disease was of the utmost importance. During the earlier portion of the World War II quinine was the sheet-anchor in the treatment as well as personal prophylaxis of malaria, until mepacrine (Atebrin) came in the field and with the fall of Java early in 1942 quinine became scarce, as 97 per cent. of the world's quinine was primarily produced in Java.

India's indigenous production of quinine from the two factories at Mungpoo (Assam) and Ootacamund (Nilgiris) amounted to approximately 80,000 pounds per annum before the war—only three per cent. of world production. This production could hardly meet the country's total civilian requirements alone which amounted to approximately 2,10,000 pounds per annum.

For the civil needs of the Indian population the Government of India had been maintaining a large central reserve which had dwindled down to about 90,000 lb. in 1933, owing to various causes, the main one being the abandonment of the cinchona plantation in the Mergui District of Burma. A Central Reserve of 1,50,000 pounds of quinine was considered necessary to provide against emergencies. The price of quinine also showed a noticeable rise. The only chance of maintaining a reasonable price was by placing a large order for the purchase of quinine abroad. An order was placed in 1940 with the Kina Bureau, Java, for the purchase of 3,00,000 pounds of quinine sulphate powder and in addition cinchona bark containing the equivalent of 80,000 pounds of quinine sulphate. This order fully materialised and out of these 3,00,000 pounds of quinine sulphate, 1,00,000 pounds were set apart as military requirements. The remaining civil requirements were distributed as follows:—

(i)	Requirements of Provincial and State Governments for over a period of four years from 1940-44	1,40,000 lb.
(ii)	Government Central Reserve (Addition was made to bring it to 1,50,000 lb. Stock being 90,000 lb.)	60,000 lb.
(iii)	Quinine in bark required by the Madras Government to be extracted at their factory ..	50,000 lb.
		2,50,000 lb.

Consequent on the entry of Japan into the war in 1941, on 5 December an order was placed on Java for the supply of 2,88,000 lb.

Information was received that all this quinine was shipped from Java early in 1942 but only 36,000 lb. were ultimately received in India as ships on which the quinine was loaded never reached India. This was the main cause of quinine shortage during the war.

POSITION REGARDING ARMY STOCKS OF ANTI-MALARIAL DRUGS

Early in 1942, the total stocks of quinine and mepacrine in the army stores were about twenty tons and two million tablets respectively. Both these drugs were, therefore, placed on the list of controlled drugs, their issue to the various commands being made by the GHQ on a specified scale every quarter. The expenditure was strictly controlled by the army.

After the loss of Java, there was little chance of replenishing the stocks of quinine as the limited yield from the cinchona plantations in India had to be set aside for the local civilian population. Immediate indents were, therefore, placed on the United Kingdom and the United States of America for large and progressively increasing quantities of mepacrine so that in course of time it practically replaced quinine as an anti-malarial drug in the army. The stocks of pyrethrum extract in India were fairly satisfactory in 1942 but strict rationing was enforced to prevent wastage as the produce from the East African pyrethrum plantations, which was the only source of supply left to the Allies, was insufficient to satisfy the rapidly mounting demands for this substance. In the meantime, intensive investigations were started to search for alternative insecticides amongst which lethane gave promising results. The problem of insecticide shortage was, however, solved only in 1944 when DDT became available in large quantities for Defence Services.

Even after the advent of DDT, pyrethrum was, for a time, needed in large quantities as it was an essential ingredient of the repellant anti-mosquito cream. This cream had originally a greasy base which, however, caused such extreme discomfort through inducing excessive sweating in hot and humid climate that its formula had to be revised to a vanishing cream base. The production of the new cream, in turn, involved many manufacturing difficulties particularly in regard to the procurement of raw materials and it took almost a year and a half before it became available in sufficient quantities to allow of unrestricted issue. Later, the synthetic liquid repellant dimethylphthalate was received in large quantities from the U.S.A. which, compared with the anti-mosquito cream, proved not only superior in action but also more convenient to use particularly in the operational areas.

No serious shortages in larvicides were encountered as, although the stocks of paris green were low; this deficiency was effectively counterbalanced by malariol and diesel oil which were available in liberal quantities at all times.

QUININE CONFERENCE, 1942

The Government of India convened a conference of the representatives of the Provincial Governments to consider measures for economising the consumption of quinine in July 1942. As a result of the discussions in the conference it was decided that there should be central control of the available stock of quinine in the country and also a planned basis of distribution. By agreement with the Provinces, an immediate cut of 25 per cent. was imposed on their annual quotas. Further, it was made compulsory for dealers of quinine to declare stocks in excess of four ounces with a view to facilitating cornering, if necessary. A circular was addressed to various firms dealing in quinine asking them to send all deteriorated stocks of quinine available, to the Medical Store Depots, where the quinine was reclaimed. The Provincial Governments were held responsible for the distribution to the general public of the quotas allocated to them, through licensed dealers at controlled prices. Departmental instructions were issued prohibiting the use of quinine in those stock mixtures and prescriptions where it was used as a simple tonic or for any purpose other than the treatment of malaria. Use of quinine as a ferri et quininae citras was replaced by ferri et ammonii citras and quinine was omitted from the composition of Easton's Syrup. Further, the wasteful practice of free distribution of quinine to the public in the Provinces was stopped. Finally, medical officers and practitioners were requested to avoid wastage of quinine in the treatment of malaria and to adhere to the quinine dosage prescribed as adequate by the League of Nations, viz., 15-20 gr. for five to seven days.

Side by side with these economy measures the Government discussed potential ways of stepping up the indigenous production of quinine. Long-term plans for expansion of cinchona cultivation at the existing sites were proposed but they were not fully implemented in view of the huge capital commitment involved and the possibility of a better and cheaper synthetic anti-malarial drug being produced. Further such long-term policies could provide no solution of the immediate problem of increasing stocks in the country.

RUSSIAN METHOD OF RAPIDLY PRODUCING CINCHONA ALKALOIDS

Information was received in 1942, of a method of rapidly producing cinchona alkaloids said to have been evolved in Russia under which alkaloids were extracted from eighteen months' old plants.

The Russians had been working on a rapid method of producing cinchona alkaloids by harvesting the young cinchona plants after they were 12 months in the ground. Cinchona seeds were sown in pots in a heated glass house in the autumn. The young seedlings were planted out in the open in the following spring. In the following autumn the whole plants were dug up and the alkaloids extracted from them. 1·25 per cent. of alkaloids in the dry plants was obtained. The Principal Quinine Officer of the Government of India had investigated the possibility of adopting this method in India. He found that the yield of alkaloids in plants grown in India was too small after 15 months but sufficient alkaloids were found in plants two and a half years old. In all 2,000 acres were being put under cultivation in Madras and Bengal to try out this modified Russian method of growing cinchona. It was hoped to produce from this source 30,000 lb. cinchona alkaloids in the course of three years. Although this scheme was successful, it meant a long-term policy apart from the expenditure involved.

In the meantime great strides were made in the United States of America and the United Kingdom in the production of the synthetic anti-malarial drugs like mepacrine and pamaquine. It was estimated that mepacrine would be produced by the end of 1943 at a rate of 1,500 million tablets per annum in the U.S.A. and 500 million tablets per annum in the United Kingdom.

During the period of war the use of pyrethrum was restricted to only military needs in operational areas and such other civil measures as were either of strategic importance or directly related to the war effort. The cultivation of pyrethrum flowers in India by the Provincial Governments, States and private cultivators was encouraged by the Central Government who arranged for the importation of quality seeds from Kenya. About 100 tons of pyrethrum flowers could be produced in India every year. The flowers grown in Kashmir and the Nilgiris in South India were tested and found to compare favourably with those imported from Kenya. During the war the entire indigenous production was, however, taken over by the military.

Supplies of mepacrine, were arranged by the Government of India to supplement issues of quinine. Mepacrine was considered safe for mass treatment on a wide scale. Distribution was to be through the same medical and non-medical agencies as were previously utilised for the distribution of quinine and other alkaloids of cinchona, e.g., school-masters, village officers, health inspectors, etc.

Two questions affecting quinine supply in India, which always had been confronting the authorities were: (a) How to devise an efficient plan for the distribution of quinine to the masses in such a way as to eliminate the middleman's profit and the possibility of the drug falling into the hands of blackmarketeers? and (b) What measures should be taken to prevent adulteration of quinine which was inevitable so long as there was a shortage of the drug?

The first question was, to some extent, solved during the war time by instituting control over the stocks of quinine in the country by the Central Government. Releases of the drug were made every year to the Provinces who arranged for its distribution to the general public and medical practitioners through licensed dealers at controlled price. Further, the Central Government arranged for the ampouling of Government quinine dihydrochloride powder by approved firms and distributing the ampoules to Provinces for sale to the public at controlled price.

A further step was taken to have an effective control over distribution of quinine and its salts imported by private individuals. Importing firms were required to hand over 60 per cent. of the imported quinine to Government and as regards the balance, which was left with them, they were required to effect sales only at controlled rates which were fixed by the Government of India from time to time. As supplies became plentiful, the condition of handing over 60 per cent. of the imported quinine to Government was withdrawn in the case of importers who were themselves manufacturers and consumed the imported article for their own manufacture.

As regards the second question, it was hoped that there would not be much room for complaints of adulteration as the Drugs Rules under the Drugs Act came into operation. Adequate provision existed in that legislation for the control of import, sale and distribution of the drug in India.

Conversion of Quinine Sulphas into Quinine Bisulphas on behalf of the CPO: In May 1943, the CPO wanted their stock of quinine sulphas to be converted into a soluble salt and a portion of the converted salt punched into five grain tablets. Factories at Bombay and Chheharta were entrusted with the work. A total quantity of 13,412 pounds of quinine sulphas was converted at the two factories and 40 lakh of five grain tablets of quinine bisulphas were punched.

Freezing of Imported Quinine: In 1942, all stocks of quinine imported into India were frozen in order to gain control of a greater part of the then existing civil trade stocks.

Requisitioning was only to be done in the case of wholesale dealers who were ordinarily dealers possessing stocks of 20 lb. or more. Where dealers could satisfy the DGIMS that there existed justifiable commitments a suitable proportion was to be left to them. As the price at which quinine products were sold in the open market, became much higher than the price at which Government stocks were retailed to the public through Government agencies, there was a possibility of quinine being bought from Government agencies with the object of selling it at a profit. The Provincial Governments were accordingly requested to take steps to ensure that stocks of quinine products sold by Government agencies were not bought by dealers, and issues of supplies to post offices and other retailing agencies were to be closely watched.

Quinine Substitutes during the War: Owing to paucity of quinine supplies, every effort was made to find out a suitable substitute for quinine. Several offers made in this connection were examined but no genuine substitute was found excepting mepacrine and later paludrine.

BLOOD PLASMA AND DESIVAC EQUIPMENT

Dried Serum and Plasma for Transfusion: The production of this material on a large scale was decided upon by the Government. Blood serum and plasma in the dried state (powder form) would be kept indefinitely and offered no special problem of storage or transport. It was readily reconstituted in liquid form for transfusion purposes by the simple addition of distilled water. It was, therefore, an ideal product for a country like India where transport and cold storage facilities were deficient and especially meant for use in forward operational areas.

Early in 1941, a pilot desiccating plant was constructed at the All-India Institute of Hygiene, Calcutta, and experiments carried out there during that year showed that the manufacture of dried serum by approved methods and the accepted technique of drying from the frozen state, was practicable in India. Accordingly two desiccating plants of the

Desivac type were ordered from the United States of America by the Government of India, each capable of producing approximately 50 litres of dried serum per week. The output of these plants was earmarked for the army and civil defence services. The first of these plants was installed at Calcutta in December 1942 which turned out 90 bottles of dried serum per week, each bottle containing the equivalent of 400 cc of reconstituted serum. Certain additional equipment for this plant ordered from America when added to the then existing machine was expected to approximately double its output.

The second plant earmarked for the Haffkine Institute, Bombay, was unfortunately greatly delayed in transit to India and owing to this and the difficulty in securing certain essential equipment the second plant was not installed until the first half of 1945 and had not gone into production before the war ended. Small quantities of dried plasma were, however, successfully manufactured by the Haffkine Institute, Bombay, by means of a locally made pilot plant.

BLOOD TRANSFUSION EQUIPMENT FOR CIVILIAN USE

Provision of special equipment and apparatus required for handling blood and its products in all its stages from donor to recipient had been a very difficult problem for civil purposes during the war.

Nearly every item of this equipment whether manufactured in India or imported was in short supply. The problem of civil transfusion services became all the more acute during the war because of priority given to the army. Particular difficulty was experienced in the supply of blood collecting bottles and other essential glassware.

The manufacturers co-operated to the best of their ability to meet demands placed on them at short notice, often in very difficult circumstances, and frequently they had to scrap their equipment suddenly to adapt their manufacturing process to repeated changes in specifications made as a result of experience gained. The Directorate of Production at the Centre gave all possible technical help to the firms in such cases.

The decision in December 1941, to start the large-scale production of serum in India necessitated the provision of certain special equipment and apparatus. This apparatus and standardised technique were devised by a committee consisting of the Directors of the Haffkine Institute, the School of Tropical Medicine, the All-India Institute of Hygiene and the Medical Superintendent, Lady Willingdon Hospital, Lahore. This standard equipment was supplied to all the centres producing serum, the transfusion sets being manufactured mainly at Calcutta and Lahore.

A standard blood transfusion set was devised and assembled by Lieut.-Colonel Hayes, IMS. He devised two types of sets, large and small, but production of the large set in quantity was not undertaken. These sets were primarily designed for and accepted as standard by the army.

To meet civil demands, based on forecasts received from the administrative medical officers, 100 small sets were purchased by

Government of India early in 1942 and were distributed to the civil blood banks as required.

The development of the civil transfusion services had enormously increased the demand for these sets and they were soon in short supply. In the meanwhile, however, the army had adopted a new type of transfusion set and was able to release certain components of a large number of Hayes sets which it was hoped would become available for civil use.

The Hayes set had certain defects, largely eliminated in the new army set.

CHAPTER VII

Procurement Activities of the Medical Stores Department during the War

Procurement of medical stores for the defence services or the civil hospitals always involved the consideration of certain definite factors such as:—

(a) Commitments and policy connected therewith
(b) Budget provision
(c) Stores provision
(d) Planning and procurement action including financial sanction
(e) Progressing of demands
(f) Inspection of stores before they were accepted and taken into stock.

Even in normal peace-time conditions a certain time lag varying according to circumstances is involved in the various stages of procurement until stores are delivered. Apart from the fact that there was constant transfer of responsibility in the middle of the war in most of the stages of procurement, the time lag in general, in obtaining stores increased enormously, particularly in the case of imported stores due to various causes, such as shipping difficulties, scarcity of shipping space and difficulties associated with production in the United Kingdom and other countries.

For nearly the first two years of the war, practically all the above functions connected with procurement activities were concentrated in the Medical Stores Department except the question of military commitments. The policy regarding the latter was mainly the responsibility of the military authorities and provision action for military requirements which was divided between the DMS and the DGIMS. A reference is made later to the frequent changes during the war in the allocation of the various functions connected with procurement. In the first instance, however, it may be of interest to state briefly the significance of the various stages involved in procurement.

(a) *Commitments and Policy:* As regards military commitments, the DGIMS although head of the Medical Stores Department had no first-hand knowledge of all secret information regarding particulars of increase in the strength of troops or their distribution and raising of new medical units on which military demands of medical stores were based. These facts were known only to the DMS in the first instance and were passed on by him to the DGIMS only to the extent considered necessary for provision of medical stores. As regards civil commitments, however, the DGIMS had always first-hand knowledge as he was connected with the Health Department, which was responsible for planning the extent and scope of civil commitments.

(b) *Budget Provision:* This meant the provision of funds from a specific Government grant or head of accounts for the procurement and supply of medical stores required including reserves for all anticipated commitments during a particular financial year. Prior to the commencement of and during the early stages of World War II the Medical Store Depots and factories of the Government of India were primarily Defence establishments catered for from Defence funds and the cost of their maintenance including cost of stores and other incidental charges were debited to the defence (military) budget. This required prior provision of funds from year to year before any procurement action could be undertaken. In addition sanction from the financial authorities was required for the actual expenditure connected with specific store purchases in every case.

As the war progressed, funds had to be allotted according to the progress of expenditure which was difficult to anticipate readily beforehand, and a fixed and specified budget could not be made. Moreover, there was the question of constant variations in prices.

(c) *Stores Provision:* This comprises of three distinct functions:—

(1) Estimation of requirements,
(2) Preparation and placing of demands on the procurement agencies or through supply organisations concerned, and
(3) The holding of stocks on their receipt and their distribution.

" Provision " is the crux of the whole system of procurement and it may be mentioned here that the principal handicap in the efficient and timely procurement of medical stores for the Armed Forces in India during World War II was that provision for military requirements in India was neither confined wholly to the DMS in India nor was it entirely in the hands of the DGIMS, but was divided between the two and was taken over by the Director, Medical Services by stages commencing in mid 1941 and only completed early in 1943.

In addition to routine demands for military hospitals, the DGIMS had to meet special demands of medical units of various kinds raised urgently during the war. The responsibility for demands in respect of new items or in respect of any item involving a departure from the prescribed scales and also requirement of all new formations and units of various kinds on behalf of the armed forces naturally vested with the DMS in India. Authorised equipment of medical units was being changed constantly. The requirements from the DMS in India for new commitments were converted into classified demands in terms of individual items of supply by the DGIMS. Financial sanction was required not only in the case of all such new commitments but also for the equipment scales applicable to them. Orders for procurement by the DGIMS could thus only be placed after approval by the Military Finance Department. The DGIMS was then responsible for procuring the equipment and drugs required by each unit and deliver the same to the DMS in India.

Commitments increased enormously as the war progressed and time lag for procurement of such stores also increased considerably whereas stores against such commitments were invariably required by the DMS very urgently. The time limit permitted in the procurement of such stores was in most cases very short with the result that enormous strain was thrown on the stores organisation of the DGIMS in complying with war commitments in scheduled time. The war reserves of imported stores which had often been utilised in the first instance against such commitments were also limited. The store margin or working stocks allowed in the depot were inadequate, viz., six months for imported stores and three months for indigenous stores as against one year's imported stocks and six months' indigenous stocks permitted during the First World War, 1914-18. This was the main factor which led to " Provision " for military requirements in India being taken over by the DMS resulting finally in complete separation into distinct military and civil medical stores organisations. In spite of this, the DGIMS still remained responsible for partial " Provision " for military requirements of forces overseas. In addition he was also responsible for provisioning the Eastern Group countries and continued throughout the war to hold military stores for them and distribute them for overseas requirements all through the war.

FINANCIAL POWERS FOR PROVISIONING AND PURCHASE

In peace the financial powers in any one item or group of items at any one period or transaction were as follows:—

Officers-in-charge Medical Store Depot	Rs.
For purchases on informal contracts up to ..	400
For purchases on annual contracts up to ..	1,000
DGIMS	
For purchases on informal contracts up to ..	1,000
For purchases on annual contracts up to ..	10,000

Prior sanction of the military financial authorities was required above these limits.

During war provisioning and purchases were permitted to be made by the Deputy Assistant Director General (Medical Stores) as follows:—

(i) Up to Rs. 5,000 without restriction.

(ii) Up to Rs. 25,000/- with the prior sanction of the Director General.

(iii) Above Rs. 25,000/- with the sanction of the Director General in consultation with Military Finance.

(d) *Planning and Procurement Action:* Planning consisted of preliminary investigation to ascertain sources of supplies of adequate standard and quality and the extent to which such supplies could be made available by suitable methods including purchase, local manufacture or importation, etc., prior to placing firm orders for procurement. This phase of procurement became all the more important during the war as many articles of the imported category became indigenous and were available locally. Planning, therefore, meant special investigation and up-to-date knowledge not only of the sources of supplies but also of the development of the indigenous industry and the consideration of the extent of production by the trade of drugs and dressings, surgical instruments and appliances etc. In view of this for planning and development a separate organisation had to be created—Central Purchase Organisation.

(e) *Progressing of Demands:* This meant keeping a close watch on the progress of procurement from the time demands were placed on the procurement agencies concerned to the time actual deliveries of stores were made. This " follow up " of demands became also an important feature of procurement during the war. A separate organisation had to be created later when procurement was taken over by the Supply Department, owing to the large volume of demands incidental to the war and the fact that deliveries were made in instalments.

(f) *Inspection of Stores:* Inspection was the last stage in the process of procurement before stores was accepted in regard to its quality or standard and the requisite specification, if any. During the first two years of the war, medical store depot did its own inspection of medical stores, manufactured locally or obtained from indigenous sources. As regards stores imported from the United Kingdom, the necessary inspection was carried out by the DGISD, London. The task of inspection of stores of indigenous origin required for the prosecution of the war assumed tremendous magnitude as the war progressed and a separate inspection organisation had to be established in April 1941, under the Controller General of Inspection, MGO Branch, Army Headquarters.

CHANGES IN THE SYSTEM OF PROCUREMENT DURING THE WAR

The first change to be introduced in the procurement of medical stores was the allocation of the responsibility to the Supply Department in March 1942. With this transfer of responsibility the following arrangements were made:—

(1) *Responsibility for Procurement:* The DGIMS exercised authority as before but was to be responsible to the Supply Department instead of to the Defence Department. Budget and financial sanctions for purchases had to be obtained from the Finance Department of Supplies instead of the Military Finance. Financial advice at the provision stage (i.e. up to the point at which detailed calculations of the DMS's requirements were made by the DGIMS was, however, to continue to be given by the Military Finance Department. This meant that provision was controlled by the Military Finance Department while actual purchases had to be sanctioned by the Supply Finance Department. As regards methods of provision and modes of purchase and internal organisation, no change was to be made in the then existing arrangements.

(2) *Changes in Provision:* An important change took place in the method of provisioning as a result of the recommendations of the Principal Staff Officers' Committee, India, 1941, recommending that the whole function of provisioning for military requirements was to be transferred to the DMS in India except that the DGIMS was to continue to hold military stores. The holding of military medical stores for the DMS by the DGIMS in his depots did not prove to be satisfactory, as the DMS found that he was not in a position to make adequate provision for military requirements until he had actual possession of all military stocks. This led to the transfer of military stocks in the depots of the DGIMS to the physical possession of the DMS. This change was completed

by the beginning of 1943. Separate Army Medical Store Depots had to be opened at various centres by the DMS.

(3) *The Five Medical Store Depots:* The Medical Store Depots at Bombay, Madras, Calcutta, Lahore Cantonment and Karachi were continued to be administered by the DGIMS on behalf of the Supply Department.

(4) *Medical Stores Committee:* The Medical Stores Committee which was under the Defence Department was transferred to the Supply Department. Its composition and function were to remain unchanged except that the Director General of Supply or his representative was to become a member.

FURTHER CHANGES IN THE PROCUREMENT ORGANISATION OF THE DIRECTOR GENERAL, INDIAN MEDICAL SERVICES

Prior to March 1941, production (i.e., *manufacture*) was largely centralised in the manufacturing depots of Madras and Bombay and purchase activities were divided between the depots and the stores section of the office of the DGIMS. The responsibility of procurement being, however, taken up then by the Supply Department, the problem at that stage was, to bring the whole procurement machinery of the DGIMS into accord with the main supply effort of the Department of Supply and to place the experience and resources of the main supply machinery fully and generously at the disposal of the DGIMS.

After the transfer of responsibility for procurement of medical stores to the Supply Member, the DGIMS became the Supply Department's purchasing agent for all medical and veterinary stores required for both civil and military purposes.

It was regarded that the machinery of the DGIMS for the procurement of supplies was suitable and the best possible under the then existing circumstances. The staff of the organisation was expanded from time to time as required. Timely intimation of new commitments taking into consideration the increasing time lag in obtaining stores especially from the United Kingdom was essential for prompt procurement of stores. This situation, however, changed rapidly by the following events:—

(1) The conclusions of the Eastern Group Conference and the decisions resulting from it, viz., India taking up an important part in supplies to the Eastern Group countries and being obliged to provide a far greater quantity of medical stores.

(2) The decisions of the Principal Staff Officers' Committee that military provision should in future be exclusively the function of the military authorities and that the DMS should in respect of military commitments be considered as a supply authority and act as an officer of the Supply Department subordinate to the Supply Member.

Thus in July 1942, it was agreed that the DGIMS should transfer to the DMS the responsibility for the whole function of provisioning with the exception that the DGIMS was to continue to hold military stocks on behalf of the DMS and to deal with them as and when required by him.

(3) The rapid increase in military demands for medical stores due to expansion.

In view of the above factors it was feared that a far greater quantity of medical stores would have to be supplied and a proper Central Planning and Purchase Organisation was necessary involving changes affecting the working of the depots and the Stores Section of the Office of the DGIMS.

In order to fall in line with the Supply Department procedure, the first change introduced in the working of the depots and the stores section at Headquarters in respect of new demands was that all indents for new demands were to be received from various indentors itemised on the standard Supply Department form WSB 69 duly sanctioned by the competent financial authority. The previous complications and calculations arising from alteration of scales and units were no longer the responsibility of the DGIMS.

CHANGES IN MILITARY PROVISIONING

These may be divided as follows:—(I) *By the DMS* in India for the Armed Forces, (II) *By the Central Provision Office* for the Eastern Group countries and forces overseas.

PROVISION OF MEDICAL STORES BY THE DMS

On transfer of responsibility of provisioning for the armed forces to the DMS in September 1941, the following procedure came into force: The Medical Directorate was to communicate their requirements to the DGIMS separately for (i) those relating to items to be issued from the existing stock to be called "Issue Orders" and (ii) those relating to items to be obtained to replenish the stocks to be called " Demands. "

The demands in respect of (ii) above were to be prepared separately for:—(a) articles from the U.K. List, (b) articles on the Eastern Group Supply List to be supplied by the Central Provision Office and (c) articles of indigenous supply.

With effect from September 1941, the Medical Directorate took over the responsibility for maintaining their stock of the various items up to the required level subject to the necessary supplies being arranged for by the DGIMS. For this purpose the DMS was to supply the following particulars:—

(1) Copies of all receipt and issue vouchers in respect of stores held on behalf of the Medical Directorate.
(2) An entry of the stock position of each item on the first receipt or issue voucher of each month.
(3) Copies of all cables despatched or received with reference to military medical stores.
(4) Information regarding any indigenous item the supply of which presented difficulty.

It was also agreed that the Medical Directorate should call for special checks of individual items as required.

It was, however, found in actual practice that the DMS could not be in actual possession of the day-to-day information regarding military stocks in the possession of the DGIMS to enable him to make adequate provision for his future requirements. This resulted in the transfer of all military stocks held on behalf of the Armed Forces in India from the physical possession of the DGIMS to the DMS in India with the consequent formation of the army medical store depots as distinct from the civil medical store depots. A reference to this has already been made earlier.,

PROVISION OF MEDICAL STORES FOR THE EASTERN GROUP COUNTRIES AND FORCES OVERSEAS BY THE CENTRAL PROVISION OFFICE

On taking over the responsibility of provisioning for the requirements of the Eastern Group countries and forces overseas by the Central Provision Office (CPO) early in 1942, the following procedure was introduced:—

> Indents for such items as could be provided by the Eastern Group countries in sufficient quantities were to be placed by the DGIMS on the Central Provision Office. This list was kept up-to-date from bulletins issued periodically by the Central Provision office. Indents for other items were sent direct to the United Kingdom.

After the DMS had converted his own requirements over a particular period in respect of indigenous items, he was to notify the Central Provision Office of the surplus production capacity of those items. The CPO was then to arrange to obtain their requirements of such items through the DGIMS.

The DGIMS held stocks on behalf of the Central Provision Office and in this connection he carried out the following procedure:—

(a) To receive and issue stores as requested by the Central Provision Office.

(b) To furnish the Central Provision Office with copies of all receipt and issue vouchers.

(c) To furnish the Central Provision Office with a stock position of each item on the first receipt or issue voucher of each month.

(d) To carry out a check of percentage of items if and when considered necessary by the Central Provision Office.

(e) To provide special information concerning any indigenous items difficult to obtain or of which there may be an anticipated shortage.

(f) To keep account of the stock held on behalf of the Central Provision Office.

(g) To maintain the necessary staff to handle the stocks.

(h) To provide after reasonable notice, additional storage facilities with adequate staff as may be required.

EVENTS LEADING TO THE INTRODUCTION OF THE CENTRAL PURCHASE SYSTEM

In March 1941, an alteration was made which had very far-reaching effects in the administration of the Medical Stores Department which was transferred from the control of the Defence Department to that of the Supply Department. The importance of this change was made apparent in May 1941, when the Supply Department made proposals for the complete reorganisation of the then existing system for the procurement of medical stores during the war.

The Director General of Supply took action immediately to post a special officer of the status of a Director in his organisation to advise the DGIMS regarding supply problems and secure for him any information required by him from the Supply Department. The officer on special duty, Mr. S. C. Latif, made his proposals for the reorganisation of the then existing system for the purchase of medical stores during the war. He recommended the following measures:—

1. The Director should examine the PV lists and classify the items into:—

(a) Those that ordinarily would be purchased centrally.

In this category would be included items that were required in large quantities and consequently for which all-India competition would secure better offers. There would also be those items requiring central planning and negotiation and also "common-user" items that could properly be added to contracts made by other Directorates and finally all items that must be imported.

(b) Those items that would ordinarily be purchased by the provincial agencies.

These would be items required in small quantity and of less value which could be obtained without difficulty and also items for which there was a localized market.

2. As forward programmes received in November 1940, had been dealt with and the indigenous items had been transferred to the depots and imported items to the DGISD, London, the Director should take stock of the position and examine such items as had not already been covered by the depots and decide whether provincial action should continue or they be dealt with from the centre.

Similar examination was to be conducted with regard to the items outstanding with the DGISD, London. The Director should constantly examine the situation in consultation with the Chief Chemical Adviser and the Planning Officers with a view to their transfer to the indigenous list.

3. Ad hoc demands should be dealt with on similar lines.

4. Items assigned to provincial purchase should be transferred to the appropriate Controllers of Supply for action through the DADG in those cases where stock position was required to be known before it was possible to determine the final quantity to be purchased. New demands would be sent direct to the Controllers of Supply.

5. Inter-provincial transfers of indents should be permitted in case a particular circle was unable to meet the demand either wholly or

partly. In such cases intimation of the transfer should be given to the authority that forwarded the indent.

6. If material was to be manufactured in a factory, the Director should determine whether the raw material should be purchased centrally. If it was to be locally arranged, he would indent directly on the Controller of Supply.

7. Depots should forward to the Headquarters details of their requirements against the annual rate contracts which would be placed from Headquarters and DADsG would be authorised to draw against these contracts direct.

8. Demands received by the depots for items not included in the rate contracts should be transferred to the Controllers of Supply who in doubtful cases would refer to the Director for instructions whether he should proceed with purchase or transfer the demand to the Headquarters.

9. Copies of all contracts placed by the Headquarters or provincial purchase organisations should be sent to the receiving depot or depots to enable the DADsG to inspect and dispose of the supply.

10. Depots should notify the appropriate quarter all deliveries against contracts.

11. All contracts already entered into under the old system should be undisturbed.

12. Personnel of the depots occupied in the work of purchase should be transferred to the controllers of Supply.

13. The Office of the Director should be increased and consist provisionally of the following staff:—

	Officer Supervisor	1
(a)	Indent Section to deal with calculations and preparation of " Home " indents, consolidation of civil demands, etc.	1 Superintendent 4 Assistants 2 Clerks
(b)	Purchase Section to deal with issue of tenders, comparative statements, drafting and issue of contracts.	1 Superintendent 6 Assistants 12 Clerks
(c)	Statistical Section to maintain all registers and prepare statements and watch delivery.	1 Assistant I/C 3 Assistants 2 Clerks
(d)	Planning Section to deal with all work and correspondence in connection with planning.	1 Assistant I/C 3 Assistants 2 Clerks
(e)	Accounts and Establishment Section to prepare the budget, watch expenditure and deal with establishment cases.	1 Superintendent 3 Assistants 3 Clerks

4 Stenographers
12 Typists
3 Despatchers.

To effect the change without dislocation of work the first step should be to organise the office at the Headquarters to deal with central purchase. An experienced man should be obtained in the grade of a Superintendent who had practical knowledge of purchase procedure of the ISD to take charge of the purchase section and the existing staff that dealt with indents should be reformed and reinforced as also the personnel that dealt with Accounts and Establishment.

As the Headquarters Office became complete, more and more items should be withdrawn from the depots.

The Controllers of Supply should similarly take over all outstanding demands at the depots and proceed to purchase decentralized items within their powers and refer to the Headquarters for instructions such as exceed their powers.

The provincial organisations should be impressed with the necessity of effecting this change without dislocation and be expected to co-operate to achieve this as quickly as possible. The details should be left to the officers concerned as circles would have special problems of their own to solve.

Thereupon it was agreed that central purchase should be introduced gradually. It was observed at that time by the DGIMS that the principle of central purchase was already in existence to a small extent e.g., in the case of textiles, sundries, imported stores, etc., although such purchases in many instances were executed through the machinery of the depots. The DGIMS, however, approved of the contracts and settled prices but the orders were placed by the depots. The question then was whether orders should also be placed directly on the firms by the Centre instead of through the medium of the depots. The then existing system of purchase by the depots was reviewed.

It was considered that the Centre should have full liberty and discretion to settle all contracts and make direct purchases; also whenever it was convenient or economical the Centre should transfer to the depots the actual purchase of stores. This was agreed to in principle.

The only disadvantage which was foreseen then regarding the adoption of the system of central purchase was the delay that might result in certain cases. For instance, if a certain number of field laboratories were required urgently by a particular date, collection of stores for these by the Centre would mean much delay whereas the depots could do this much more quickly. It was agreed that such cases might be transferred to the depots for purchase and collection. It was also agreed that as soon as any contract with a depot expired it should be considered whether the question of fresh contract should be taken up by the Centre from the depot concerned.

The war had, however, brought about unprecedented changes. The depots had then to deal with stores many times above the pre-war level and far beyond what peace-time methods could deal with satisfactorily. The enormous increase in activities all round resulted in a condition of affairs with which the normal peace-time organisation was unable to cope. There were difficulties in the way of securing supplies which continued to grow as the various demands for medical stores increased in volume and complexity. It became obvious then that these difficulties could only be overcome by central planning and concurrent central purchase. It was, therefore, decided that the Stores Section of the office of the DGIMS should be strengthened and reorganised on the same lines as the other directorates of the Department of Supply and that the reorganised Section should take over from the depots the function of purchase which was of much greater importance and magnitude than it was before. The Government of India agreed to the gradual introduction of the central purchase system. They also sanctioned in this connection in June 1941, an addition of one Superintendent, one Assistant-in-Charge, ten Assistants and 22 Clerks to the ministerial staff of the Stores Section of the office of the DGIMS.

It was agreed that a full-time officer should be appointed in charge of the purchase sub-section of the Stores Section. It was emphasised that there should be complete control of purchase at the Centre. It was, however, not lost sight of that judicious decentralisation had also its strong features and purchases by the depots in any purchase scheme had advantages and this could not be rapidly transferred to the Centre.

It was anticipated that as central purchase went on gradually increasing depots would be given less and less to purchase. It was also noted that although orders for purchase would be placed by the Centre, it was the depot officer who had to inspect the goods so that they were delivered in time. It was, therefore, considered desirable in cases of local purchase of articles to relieve the officers in charge of the depots of actual purchases as far as possible and utilise the services of the Controllers of Supplies of the Provinces for this purpose. In this connection it was also considered essential that there should be close collaboration between the depot officer and the Controller of Supplies concerned.

As a preliminary to the introduction of central purchase the three branches which then constituted the Stores Section of the office of the DGIMS were reorganised into five as follows in June 1941:—

1. Indent Branch
2. Statistical Branch
3. Planning Branch
4. Purchase Branch
5. Administration Branch

FORMATION OF THE CENTRAL PURCHASE ORGANISATION IN NOVEMBER 1941 AND ITS DEVELOPMENT

It was soon realised that several officers would be necessary for the Central Purchase Branch and that owing to the specialised nature of the work many internal administrative matters would require attention so that an officer to assist in internal policy and administration was immediately necessary. It was considered essential to have an officer who was familiar with the medical stores procedure and who had had wide experience of handling medical stores. A post of Central Contracts Officer was thus created immediately for the Purchase Branch in November 1941. A post of Special Officer Supervisor for the Purchase Branch was also sanctioned in December 1941.

Increase of Purchase Powers

Consequent on the introduction of central purchase system the powers of purchasing of various officers in the office of DGIMS were considerably increased and from 12 November 1941 were as given below:—

1. DGIMS up to Rs. 10 lakhs.
2. DDG (Stores) up to Rs. 4 lakhs.
3. Dy. Controller (Purchase) up to Rs. 3 lakhs.
4. Asstt. Dy. Controller (Purchase) up to Rs. 30,000/-.
5. Dy. Asstt. Controller (Purchase) up to Rs. 15,000/-.
6. DADG (MSD) up to Rs. 2,000/-.
   (or Rs. 5,000/- in consultation with the Controller of Supplies of the area concerned).

These powers remained unaltered until the Central Purchase Organisation was transferred from the DGIMS to the Director General of Supply on 1 July 1943, when numbers (1), (2) and (6) on the above list ceased to exercise their purchasing powers.

Statistics by Hollerith System: Hollerith system of accounting was introduced in the Directorate General of Supply with effect from 1 January 1942. A revised procedure for the registration and transmission of indents, acceptance of tenders and inspection notes and for the recording of data therefrom on Hollerith Cards was also introduced as part of this new scheme.

The introduction of the Hollerith system made it possible to prepare statements showing uncovered demands and give information regarding indentors whose demands were uncovered even before the Purchase Branch had been properly organised. Further a great advantage of utilising this system was that during the period when the Purchase Branches were heavily in arrears, maintenance of essential statistics continued without interference with procurement action in the Purchase Section proper.

The system of central purchase necessitated the reorganisation and augmentation of the small staff emlpoyed in the Purchase Branch. The existing Planning and Purchase Branches of DGIMS were enlarged and reconstituted into two divisions, viz., a directorate of planning and production and a directorate of purchase.

Directorate of Planning and Production: The Directorate of Planning and Production was further sub-divided in two branches—the Drugs and Dressings Branch and the Instruments and Appliances Branch.

Drugs and Dressings Branch: This was placed under the Director of Production (Drugs and Dressings) and its functions were as follows:—

(1) Procurement by trade of drugs and dressings which were not manufactured in the medical stores factories.
(2) Procurement of raw materials necessary for manufacture in the medical stores factories.
(3) Development of manufacture in India of items hitherto imported.
(4) Liaison with firms manufacturing drugs and dressings and parenteral injections.

(5) Standardisation and examination of drugs in consultation with the Chief Advisory Chemist.
(6) Watching of deliveries on supply orders.
(7) Dealing with " hereafter " items of initial equipment of field medical units and overseas indents.

Instruments and Appliances Branch: This was in charge of the Director of Production (Instruments and Appliances) who was concerned with the following:—

(1) Production by trade of instruments and appliances.
(2) Development of manufacture in India of items hitherto imported.
(3) Liaison with firms manufacturing instruments and appliances etc.
(4) To deal with " hereafter " items of initial equipment of field units and overseas indents.
(5) Arrangement for inspection of instruments produced by the trade.
(6) Watching of deliveries on supply orders.

Directorate of Purchase: This was placed in charge of the Central Contracts Officer who was concerned with placing orders for purchase on the advice or information furnished by the Directors of Production. He dealt with all tenders, contracts and purchase. Actually in organising this directorate the then existing Purchase Branch of the Stores Section of the office of the DGIMS was organised as a Purchase Section in November 1941, being reconstituted and sub-divided into the following branches:—

(1) *Indent Branch (Purchase):* It was to receive and examine all demands for purchase. As this branch was attached to the Purchase Section, a close watch had to be kept on all demands for purchase from the time of their receipt until delivery had been effected.

(2) *Three Purchase Branches:* These were to deal with:
  (a) purchase of indigenous drugs and dressings,
  (b) purchase of indigenous instruments and appliances, and
  (c) transfer of demands to the CPO, the Director General, India Store Department, London, and any other directorate concerned; also preparation of lists of items to be manufactured by depots for transfer to the depots concerned.

The procedure for central purchase of any item or groups of items belonging to an indent was formulated after discussion with the Director of Production concerned.

Finally for the working of the Planning and Purchase Branches in February 1942, the following staff was sanctioned:—

GAZETTED STAFF

Planning	*Purchase*
1 DDP (D & D) Drugs & Dressings. ..	1 ACP
1 ADP (I & A) Instruments & Appliances.	3 DACPs
1 ADP (D & D)	
8 POs (5 for D & D and 3 for I & A)	

MINISTERIAL STAFF FOR BOTH PLANNING AND PURCHASE DIRECTORATES

5 Assistants-in-charge.
6 Assistants.
35 Clerks III Division.
4 Stenographers.

The Purchase Directorate was reorganised into six branches and the Planning Directorate was split up into two with the above staff.

The post of the Central Contracts Officer was abolished and that of Deputy Controller of Purchase was created in its place in May 1942. An additional post of ACP was created in July 1942, one post of DACP in September 1942 and two posts of DACPs in October 1942. The then existing post of DCP was redesignated as DCP I/C on 25 May 1943. An additional post of DCP was created during June 1943. Staff was increased in May 1942 and again in September 1942 and December 1942.

Planning Branch (Drugs and Dressings): One of the sections remained responsible for normal planning matters and the other took over questions connected with production only, e.g., procurement of raw materials, securing of necessary facilities of transport, labour, fuel, packing material, and attending to the concomitant difficulties experienced by the firms in executing supply orders. The Production Branch was also made responsible for maintaining a record of the country's productive capacity of various items and the volume of demands received.

Planning Branch (Instruments and Appliances): The expansion of the Purchase Directorate brought with it a large increase in the work of the Planning Branch (Instruments and Appliances) also.

Statistical Cell: The statistics of the work done in the Purchase Directorate were maintained on the Hollerith system in the Statistical Section of the Directorate General of Supply. Owing to the vast expansion of the activities of the Purchase Directorate, a separate statistical cell in the office of the DGIMS to function as an independent unit under his supervision was sanctioned with a large staff.

Progress Branch: In September 1942, the Department of Supply introduced a detailed system of " progressing " with a view to eliminating delays in the execution of orders placed on the Department of Supply by ' chasing ' or ' following up ' indents from the date of their receipt to the final completion of deliveries. This also included a study of the supply prospects so that an indentor could be informed in time of the probability of actual supply or failures in supply. A whole-time progress officer with ministerial staff came into existence in November 1942.

The organisation as outlined above, remained unchanged in its broad frame-work until the Planning and Purchase Branches were transferred to the Director General of Supply (Medical Division) in June 1943.

CIVIL PROVISIONING

The DGIMS remained responsible for civil provisioning in conjunction with the officers in charge of Medical Store Depots.

After the completion of transfer of all military stocks, the stocks of medical stores for the civil in the depots of the DGIMS became extremely low, while simultaneously there was rapid increase in the number of civil indentors on the Government Medical Stores Department due obviously to the shortage of stocks with the trade. Civil commitments having thus become proportionately large, the previous system of provisioning based on past issues did not, under the circumstances, prove satisfactory. Supplies were difficult to obtain from the U.K. sources and it was doubtful if civil indents would be given any high priority.

In September 1942, the Medical Adviser to the Secretary of State for India, London, suggested that India may devise a formula for civil demands based on population and hospital beds. The Central Civil Provisioning procedure was at that time only just being established, being based primarily on the detailed itemised demands received from the Provinces which in turn depended upon the actual monetary allotments for medical stores made by their respective Governments. Moreover, it was not at all likely then that demands regulated on the basis of population and hospital beds would meet with the approval of the Provincial Governments.

Considerable expansion in civil custom occurred steadily owing to the following additional civil commitments on the Medical Stores Department:—

(i) Punjab Government Local Fund Hospitals and Dispensaries.
(ii) Five company managed railways.
(iii) The newly established Civil Defence Department of the Government of India and Provincial Governments requiring stores for ARP purposes.
(iv) United Provinces (Government & Local Fund Hospitals and Dispensaries about 800 in number) and Orissa—Hospitals and Dispensaries under the management of local bodies.
(v) Civil Administration of the area in Burma unoccupied by the Japanese.
(vi) Sundry Organisations and Institutions, such as Cantonment General Hospitals, Refugee Organisation in Assam, Netherland Pilgrim Hospital, Jedda Pilgrims, Civil Administration, Ceylon, etc.
(vii) Towards the end of 1943, Indian Red Cross Society and Refugee Organisation in Chittagong and port of Burma.

This meant an increase in civil provisioning of roughly 25 per cent. Taking these additional liabilities of the Medical Stores Department during the war into consideration, it was anticipated that provision of medical stores for the civil during World War II would easily be more than double compared with that in the pre-war years.

Establishment of Civil Provisioning Section

Owing to the enormous expansion of civil custom during the war, a separate Civil Provisioning Section was established in the office of the

Director General, Indian Medical Service in November 1942. Due consideration was to be given to the following factors:—

(a) Addition of new indentors or exclusion of past indentors.
(b) Possibility of an epidemic.
(c) Short supply or non-availability of any article.
(d) Substitution of one article for another.
(e) Defective new items.

The depots were required to review the provisioning position twice a year and furnish statements showing various details concerning their demands to the office of the Director General, Indian Medical Service on a special proforma.

These statements were to be scrutinised by appropriate Financial Adviser Supply. The reviews received from the depots were consolidated in the office of the Director General, Indian Medical Service and the consolidated statements were to be submitted to the Military Finance Authorities for their approval. Appropriate action was then taken by the DGIMS.

The consolidated demands for civil stores prepared were thus placed on the Central Purchase Section.

Although theoretically civil provisioning was established centrally on a sound basis, it was found in practice that for a long time (over a year) no satisfactory progress could be made in the actual procurement and in the delivery of stores which were required urgently by the civil Medical Store Depots. Considerable delay had occurred in procuring stores on the basis of demands submitted to the Supply Department both in 1941 and 1942 with the result that the stocks in the depots had fallen far below the prescribed working margin. This was mainly due to the fact that the complicated and elaborate system of central procurement introduced in the middle of the war took a long time to stabilise and to take shape in functioning effectively. There was in addition the difficult problem created by the wholesale cross-mandating by the Central Purchase Section on depots in 1942 and 1943 of civil demands on a large scale long outstanding on the Supply Department and it became impossible for the depots to cope up with their procurement efficiently. There were also delays in the supply of manufactured articles under the revised procurement procedure, in accordance with which the factories at Bombay, Madras and Chheharta (Amritsar) received cross-mandates from the Supply Department (Purchase Branch) for the manufacture of certain items. The purchase of raw materials required was arranged centrally by the Supply Department or by the Medical Store Depots locally if so indicated in the cross-mandates. Thus there was considerable time lag in the procurement of raw materials and the factories found difficulty in manufacturing finished products, as even if one ingredient was not available the manufacturing process could not be finished. In view of these difficulties it was most essential to maintain a reserve of raw materials for the factories at the manufacturing depots to be utilised and replaced as supplies against sub-mandates received.

Bedaux Committee 1943: All the above-mentioned factors naturally led very soon to serious shortage of civil stocks during the war, particularly during mid 1943. The whole position of civil shortage had to be investigated later in 1943 by the Bedaux Committee. According to the recommendations of this Committee special emergency additional demands for indigenous and imported stores for the depots and for reserves of raw materials for the factories were placed for early procurement on the Supply Department.

TRANSFER OF CONTROL OF PROCUREMENT OF MEDICAL STORES TO THE SUPPLY DEPARTMENT—TRANSFER OF MEDICAL STORE DEPOTS TO THE CIVIL CHARGE

No far-reaching changes were made in the central administration of medical stores procurement, following the separation of the military from the civil until early 1943, when arrangements for the procurement of medical stores for the civil and for defence purposes were reconsidered in the light of the development in the Central Purchase Organisation, and it was decided by the Supply Department, Government of India, in consultation with all concerned, to separate the procurement functions of the DGIMS from his provisioning functions. As a result of this decision the Planning and Purchase Sections of the office of the DGIMS were transferred *in toto* to the direct control of the Directorate General of Supply with effect from 1 July 1943, from which date the DGIMS ceased to have anything to do with the actual procurement of medical stores either for the military or the civil except perhaps for emergency requirements of the civil only. This was a very important administrative change.

The arrangements came into force in March 1941, by which the procurement of medical stores for civil and military purposes was to continue to remain the function of the DGIMS although the ultimate responsibility for procurement was that of the Supply Department. They did not work smoothly in spite of the agreed modification from time to time.

In the matter of estimation of demands, stocking and distribution of military stores for the Defence Services there was constant disagreement between the DMS in India and the DGIMS prior to mid 1942 when the DMS decided to establish his own army medical stores. Moreover, the arrangements under which the DGIMS had many civil functions to perform and acted as a part-time officer of the Supply Department were admittedly not very satisfactory. By October 1942, the Financial Adviser (Military Finance) brought matters ahead by pointing out that with the increasing importance of civil provisioning and expansion of civil demands during the war, the debiting of all expenditure by the Medical Store Depots to HMG, irrespective of whether the expenditure in question was incurred on behalf of the civil or the military was not justifiable. This criticism and the probability that the scope of civil provisioning would then soon be greatly widened made the reconsideration of the matter necessary and a review of the whole position was then undertaken. The following final arrangements were, therefore, made in June 1943, laying down the revised procedure for the provisioning and procurement of medical stores.

(1) *Provisioning:* The arrangements for military provisioning were to remain as they were, namely, the DMS was to continue to perform full provisioning functions including the holding and issue of stocks. The Central Provision Office was also to continue to do its own provisioning except that the DGIMS was to remain responsible for holding CPO stocks and distributing them as required by the Central Provision Office. Civil provisioning was to be the responsibility of DGIMS but that department was to take over the administration of the Medical Store Depot factories from the Supply Department. Strictly speaking the factories had to go to the Supply Department with the transfer of procurement and not to remain with the DGIMS who was responsible only for the provisioning of civil requirements. However, as the factories could not be easily separated from the depots it was decided that the Director General of Supply would use the depot factories for the manufacture of drugs and dressings according to his orders. The factories though under the administrative control of the DGIMS were thus to manufacture according to the programme laid down by the Supply Department.

(2) *Procurement:* All procurement, central, regional and overseas was to be transferred by the Director General, Indian Medical Service and was to be the responsibility of the Director General of Supply who created a new " Division " to handle procurement of medical stores. For the procurement of medical stores required by them, the DMS, the Central Provision Office and the DGIMS were to place firm demands on the Director General of Supply in accordance with the Supply Department procedure. A separate division under the Director General of Supply called the " Medical Division " was thus established. The planning and purchase staff employed in the Stores Section of the office of the DGIMS was transferred to the new division. The staff consisted of approximately 30 officers and over 260 clerks at headquarters alone. Purchase action to meet demands for medical stores was taken by the Supply Department either centrally through the Central Purchase Organisation which was transferred from the DGIMS to the Director General of Supply or through the local Controllers of Supplies on indents cross-mandated to them. As regards manufactured articles formal orders were placed on the factories.

With the transfer of procurement to the Supply Department, responsibility for medical stores was distributed as follows:—

Function	*Administrative responsibility of*	*Financial responsibility of*
(1) Military provisioning for the Defence Forces in India including the administration of Army Medical Store Depots.	DMS under the War Department.	Financial Adviser (Military Finance)

(2) Military provisioning for Armed Forces overseas and Eastern Group countries.	CPO	HMG
(3) Stock holding for CPO	DGIMS under EH & L Department.	FDOB (Finance Dept. Ordinary Branch).
(4) Civil provisioning and administration of Medical Store Depots and Factories.	DGIMS under EH & L Department.	FDOB
(5) Procurement for civil and military, central, regional and overseas.	DG of Supply under the Supply Department.	Finance Dept. (Supply Finance).

The Education, Health and Lands Department thus assumed responsibility for civil provisioning and the administration of the Medical Store Depots and factories from 1 June 1943. The other changes outlined above viz., the actual transfer of staff etc., were brought into effect from July 1943.

The Military Accountant General and the Director of Audit, Defence Services were to continue to be responsible for the maintenance of accounts and for the audit of expenditure on civil provisioning and administration of civil depots. The Finance Department Ordinary Branch (Civil) was to be responsible for the control of expenditure and details of accounting.

The Medical Stores Supply Committee was to remain under the control of the Supply Department although the DGIMS was to continue as its Chairman.

The Medical Division of the Supply Department was to be responsible for placing all orders for procurement. It was also the controlling authority for stores imported from abroad for both civil and military purposes.

Towards the end of the war, however, the military authorities undertook their own procurement of imported medical stores; although the responsibility for procurement remained with the Supply Department, so far as indigenous stores for both civil and military purposes and imported stores for the civil only were concerned.

TRANSFER OF MEDICAL STORE DEPOTS AND FACTORIES TO THE CIVIL CHARGE

Following the centralisation of provisioning for civil requirements of medical stores all over India and the taking over of the responsibility for civil provisioning by Education, Health and Lands Department, Government of India, it was decided to transfer the assets in the Medical Store Depots at Bombay, Madras, Raipur and Lahore Cantonment and of the factories at Bombay, Madras and Chheharta (Amritsar) from the War Department to the Education, Health and Lands Department with effect from 1 June 1943.[1] The terms of transfer were briefly as follows:—

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[1] Finance Department Letter No. D-389-W (MS)/43 Dated 27 September 1943.

(1) Buildings, plant and machinery to be transferred free of cost for the duration of the war. The Education, Health and Lands Department was, however, to meet the maintenance charges for government buildings and pay rent for the hired ones. The Military Accountant General was to continue to maintain valuation account of the buildings, plant and machinery to facilitate adjustment of expenditure betweeen Civil and Defence Estimates and HMG.

(2) Stores as shown in the books of the Medical Store Depots in June 1943 were to be transferred on payment as follows:—

- (a) PV items would be paid at PV rates, *minus* 1/6th on account of departmental charges,
- (b) NIV (not in priced vocabulary) items to be paid at cost price, and
- (c) Unserviceable, repairable and shop-soiled articles to be paid for at a valuation to be fixed by the DGIMS.

It may be mentioned here that although it was decided then to transfer the above assets from the War Department to the Education, Health and Lands Department for the duration of the war only, this transfer of the Medical Store Depots and factories to the civil charge was in fact effected as a permanent measure after the war was over.

With effect from 1 October 1944, in accordance with the decision of the Auditor General of India the audit and accounting work relating to the Medical Store Depots and factories was then taken over by the respective provincial Accountants General as sub-audit officers of the Accountant General, Central Revenues.

INSPECTION OF STORES

Until mid 1941, inspection of all medical stores was the responsibility of the DGIMS. No inspection of stores from the United Kingdom was carried out in India except in the case of consignments damaged in transit. Stores manufactured in the factories were thoroughly tested in all stages of manufacture. The inspection of instruments and appliances was carried out by the officers of the stores department who kept standard samples, if not in all, in many cases, and otherwise referred to specifications given in standard catalogues of well-known British manufacturers.

As regards stores purchased locally, particularly manufactured drugs, the samples were tested in various Government laboratories, namely, the Biochemical Standardisation Laboratory, Calcutta, Alipore Test House, Calcutta, laboratories attached to the medical stores factories etc.

The need for a separate organisation for inspection was keenly felt with the progress of the war owing to enormous increase in work and paucity of staff in stores depots.

Commencing from about April 1941, steps were taken to amend mobilisation equipment scales to standardised patterns of instruments and to centralise planning and purchase. A general review of all military stocks was then carried out which revealed the following anomalies:—

(1) Mobilisation equipment scales had undergone constant changes and stocks of obsolete pattern were held.
(2) Purchases of surgical instruments, appliances and sundries, etc., effected by different officers in different parts of the country resulted in variations in designs.
(3) Purchasing and inspecting authorities possessed neither standard samples in all cases nor satisfactory means of examining their purchases.
(4) Established dealers of repute being very few, smaller firms had to be asked to produce articles for varied quantity and quality which they had never been called upon to do before and of which they had often no previous experience.

In view of the fact that ordnance stores were already being examined by the Controller General of Inspection (MGO Branch) it was decided that inspection of medical stores would also be his responsibility. It was agreed, however, that the DMS in India would provide the necessary technical personnel and the DGIMS would provide laboratory facilities for the testing of drugs etc. An Inspectorate of Medical Stores and Equipment was thus formed under the orders of the Controller General of Inspection which included the following:—

(1) Stocks purchased centrally or locally for the Defence Services including the Central Provision Office.
(2) Stocks purchased centrally or locally on behalf of any overseas Government or civil department, local government institutions, civil indentors and the Red Cross Organisation.
(3) Stocks of items manufactured in Government controlled institutions.

In the first instance two important appointments were made, viz., the Chief Inspector of Medical Stores (CIMS) who was to be a pharmaceutical chemist, and his deputy who was to be a surgeon. The Deputy Chief Inspector of Medical Stores was stationed at the Ordnance Laboratories at Cawnpore, where in conjunction with Ordnance experts he proceeded to draw up standard specifications for surgical instruments and appliances. The Chief Inspector of Medical Stores established a chain of inspection depots at Bombay, Madras, Calcutta and Lahore Cantonment each to function under an Assistant Inspector of Medical Stores. Later on in the war, inspection depots were also established at Delhi, Karachi, Lucknow, Sialkot and Cawnpore, where technical officers were appointed to inspect the bulk supplies of medical stores delivered by the trade. After inspection the stores were passed on either to the Army Medical Stores or Medical Store Depots in that area. The Ordnance Laboratory at Cawnpore exercised control over instruments and appliances by means of checked samples sent from bulk supplies.

For the purpose of examining the quality of instruments and appliances or supply of medical stores, and the storage conditions of such equipment, the Chief Inspector of Medical Stores and the Assistant

Inspectors of Medical Stores were authorised to enter any Medical Stores Depot, Army Medical Store, medical mobilisation store, military hospital, veterinary hospital, laboratory, dental centre or any other building or store where medical equipment was being manufactured or stored or was in use. They were further authorised to stop the issue or use of any item which in their opinion was unfit for use and to send such items for examination to such persons or laboratories as were authorised to examine and test them.

To enable drugs etc., to be tested the then existing facilities of the Biochemical Standardisation Laboratory, Calcutta, were enlisted in the first instance. For this purpose, this laboratory was strengthened by the necessary additional staff. This laboratory played an important role in the inspection of drugs during the war.[2] The facilities afforded by the Haffkine Institute, Bombay, for testing samples of drugs were also utilised during the war. Testing laboratories for inspection purposes were, in addition, established in Madras and Lahore and a Central Medical Laboratory for examination of drugs was later established in Delhi in the premises provided by the Delhi University.

The Inspectors nominated by the Chief Inspector of Medical Stores or his Assistants had to sign inspection certificates, receipt certificates or inspection notes on special forms devised for the purpose. The Chief Inspector of Medical Stores was responsible for the preparation and sealing of specifications and drawing of patterns of all items included in the priced vocabulary of medical stores.

For the purpose of inspection medical equipment included all surgical instruments, appliances and materials, medicines and medical material, dental and X-ray equipment, laboratory chemicals and apparatus and other items specified in the PVMS.

As a result of inspection of surgical instruments and appliances it became apparent that without technical assistance from Government or other sources, trade in India was unable to produce surgical instruments of the required specifications. It was then decided by the Controller General of Inspection in the latter part of 1943 in consultation with all concerned that necessary technical asistance should be provided by the Inspectorate of Medical Stores and as a result of this decision, a Control Officer (Surgical Instruments) was appointed. This officer was nominally attached to the Ordnance Laboratories in Cawnpore, but he and his staff were located in the main producing area of Sialkot.

LEASE/LEND AND CIVIL TRADE REQUIREMENTS—EXPORT IMPORT BRANCH, CONTROL OF EXPORTS AND IMPORTS

Lease/Lend and Civil Trade Requirements

Until the beginning of 1941, the general policy regarding India's requirements of imported stores was that all orders for their procurement were placed on the United Kingdom in the first instance. India was, however, at liberty then to order any item direct from the United States of America without authorisation from London, if the British Purchase Commission were satisfied that no conflict with the interests of the Empire Programme would arise. Such orders, however, were exceptional and the normal practice followed was to transmit all orders for imported stores to London so that advantage could be taken of whatever source of supply was likely to give the best results whether in the United Kingdom or in America. As regards supply of medical stores arranged by the Secretary of State for India, London, the policy then was to supply essential requirements as far as possible from the United Kingdom leaving residual demands to be met from the United States of America. Also in order to avoid the risk of duplication, civil demands on the United States of America from India had also to be referred to the Secretary of State for India, London, in the first instance.

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[2] See Memorandum on War work—Medical Stores Inspection done by the Biochemical Standardisation Laboratory, April 1942—May 1945, by Dr. B. Mukerji, Director, Central Drugs Laboratory.

Soon, however, after the passage of Lease/Lend Bill in 1941, and the extension of Lease/Lend facilities to India it became necessary for the American Administration to present appropriation estimates of material to be placed at the disposal of Empire countries and to plan carefully and control forward production.

In connection with the general Lease/Lend agreement entered into between the United States of America and the United Kingdom for the supply from the United States of America of goods essential for the prosecution of the war, the problem of medical supplies to India and the several Dominions and Colonies was also not lost sight of. A meeting was held in London to discuss the various aspects of this question in October 1941. A memorandum of this meeting was forwarded by Dr. John R. Mote of the British Purchasing Commission and Ministry of Supply Mission, United States of America to Mr. A. C. Symon of Indian Purchase Mission, New York, on 23 October 1941.

On account of shortage of supplies both in the United Kingdom and the United States of America all demands on both these countries were subjected to much closer scrutiny than before and in all cases the following information was required in order to calculate allotments to India:—

(a) Stocks.
(b) Local Production.
(c) Annual Consumption.
(d) Military demand to be supported by the number of troops and the number of hospital beds involved.
(e) Civil demand to be supported by population and the number of hospital beds.
(f) Quantity for reserves if applicable.

In any case it was decided that the proportion of the estimated demand at (d) and (e) for use of the U.K. authorities must always be stated as the Ministry of Supplies in the United Kingdom calculated requirements on this basis. It was at the same time made clear by the Secretary of State for India, London, that orders placed on the United

States of America through normal trade channels for commodities in short supply were unlikely, to be accepted because this supply must be made from the United States of America's domestic allocation and it was in the interest of any country looking to the United States of America for supplies to arrange for demands to be placed, as far as practicable, through Government channels and not through the trade.

Dr. Mote's Memorandum: The following were the main features of this memorandum:—

(i) It was agreed that both because of lesser shipping risks, and because of trade shortages in the United Kingdom, it was desirable as a matter of policy that, as far as possible, India, Dominions and Colonies should obtain direct from America rather than from the United Kingdom those medical supplies which were either not indigenous or in the case of the Eastern Group not produced within that group.

(ii) Medical supplies were to be divided into two categories viz.:—

  (a) Government requirements, i.e., requirements of the Defence and other Government Services.

  (b) Requirements of the civil population normally handled by non-government trade channels.

With regard to Government requirements it was accepted in principle by the United States of America that India should obtain these under Lease/Lend and that in order to enable the United States of America to plan production and meet demands, the procedure should be as follows:—

1. Estimates for a forward period of two years should be forwarded to Washington forthwith, and should be prepared on the assumption that no supplies would be available from the United Kingdom. They should cover all supplies not locally produced from indigenous material, or not adequately procurable within the Eastern Group. This was to enable forward planning and production to be carried out in the United States of America.
2. Actual demands based on the above demands, should be placed as far ahead as possible, preferably six months' requirements.
3. Estimates and demands should conform as far as possible to the War Office classification of medical equipment i.e.,

Section 1 — Drugs, chemicals, reagents, sera and vaccines
„ 2 — Tablets
„ 3 — Surgical dressings
„ 4 — Rubber and water-proof goods
„ 5 — Surgical and optical appliances, splints and sundries
„ 6 — Surgical instruments
„ 7 — Aseptic furniture
„ 8 — Specialised equipment for use in the field e.g., panniers
„ 9 — X-ray and photographic apparatus and material
„ 10 — Dental instruments, appliances and materials
„ 11 — Laboratory apparatus and stains
„ 12 — Electro-medical and electro-therapeutic apparatus.

Included with Dr. Mote's memorandum was a list of proposed drugs which might be considered essential to the health of both the armed forces and the civilian population and which had been accepted in principle by the Lease/Lend administration. It was made clear that with very few exceptions, drugs not on the list would *not* be procurable under Lease/Lend at any time, although suggestions for amendment to the list as submitted were invited. With regard to medical supplies for the civilian population, normally, handled through non-government trade channels it was pointed out that the problem was more complex. The United States of America, however, agreed in principle that essential medical supplies for the civilian population might be obtained from that country under Lease/Lend, but the conditions would naturally be much more strict than those covering Government supplies. Consequently Lease/Lend procedure would probably be limited in this case to a relatively small group of essential drugs and medical supplies which for reasons of shortage could not readily be obtained through regular trade channels.

It was suggested that the complete position should be reviewed and that estimates for civil requirements for two years of essential items normally obtained from the United Kingdom should be prepared in the following form and sent to Washington:—

1	2	3	4	5	6	7
Items	Stocks on hand-manufacturers and wholesalers	Yearly requirements	Yearly local production	Yearly imports	Major sources of imports	Remarks

The Lease/Lend administration accepted in principle the proposals set forward in Dr. Mote's memorandum on Empire co-ordination of medical requirements.

Following the receipt of Dr. Mote's memorandum, it was decided that:—

(a) Lists of permissible items by sections were to be prepared.
(b) Director of Medical Services in India should be asked to submit two years' estimates of military requirements before 15 December 1941.
(c) Civil Government Hospital estimates (including Local Bodies Hospitals) should be prepared.
(d) Letters should be addressed to importers calling for returns of imports of permissible medical stores. The response to this from the importers was, however, not at all satisfactory and ultimately estimation of trade requirements had to be made on the basis of the proportion of the total valuation of average annual imports of drugs as ascertained from the Director General of Commercial Intelligence and Statistics to the total valuation of the average annual Government import of drugs which was roughly 10 to 1. Civil trade requirements were, therefore, taken for purposes of estimation to be approximately ten times the Government requirements,

Export/Import Branch

As a result of Dr. Mote's memorandum and with the establishment of the Lease/Lend procedure in 1941, the work in connection with the procurement of stores from the United States of America increased enormously. In order to give effect to Dr. Mote's recommendations a new branch was formed in December 1941 in the office of the DGIMS to carry out work in connection with the furnishing of estimates, forward programming, placing of orders and controlling the distribution of supplies when received under Lease/Lend agreements. The work in connection with the control of export and import licences for medical stores which was devolved upon the office of the DGIMS, since the commencement of the war also increased to such an enormous extent that the Chief Advisory Chemist who was dealing with it was no longer able to cope with it. Moreover, subsequent to the establishment of the Lease/Lend procedure it was decided that the DGIMS should be responsible for advising the Departments of Commerce and Supply with regard to the general aspects of imports and exports of medical stores. These duties in addition to those relating to Lease/Lend medical stores were made the responsibility of the new branch which was called the *Export/Import Branch* which dealt not only with all medical supplies to be obtained by India under the Lease/Lend procedure but also with all questions concerning imports and exports. A new post of Export/Import Officer was also created by the Government in December 1941 to be in charge of this branch. As it was essential that the officer selected for this purpose should have considerable experience of the drug import trade and should possess the confidence of the trade, the Sales Manager of Messrs. Boots Pure Drug Co. Ltd., was selected for this post in April 1942. In May 1942, the DGIMS was authorised to issue export licences in respect of certain classes of drugs, medicines and surgical instruments.

ACTIVITIES OF THE EXPORT/IMPORT BRANCH

The activities of the Export/Import Branch began with the first definite demand for certain items of medical stores, which according to the instructions of the Secretary of State in January 1942, had to be obtained from the United States of America. The DGIMS was then asked by the Secretary of State for India to intimate his firm demands of medical stores under Lease/Lend for 1942, and estimates for 1943 including military medical requirements, government civil requirements including ARP demands and trade requirements, without delay to the United Kingdom for supply under the following two main heads:—

(i) Government requirements
(ii) Trade requirements

Considerable difficulty was experienced in preparing trade estimates at short notice, as although importers were called upon to furnish returns of past imports in respect of permissible or essential medical stores, no assistance could be had from them and rough estimates had to be prepared on the basis of information available from the Director General of Commercial Intelligence and Statistics.

The estimates for 1943 were to include also Burma's requirements for military and civil including ARP.

Most of the items mentioned above under (i) and (ii) with the exception of a few were diverted by the United Kingdom to the United States of America.

Besides the demands and estimates referred to above the Director General, Indian Medical Service was also asked to furnish a two years' estimate for all imported items of medical stores falling under the 12 Sections specified in Dr. Mote's memorandum. This was intended for planning and production in the United States of America.

Later in the year 1942 firm demands were placed on the United States of America for 1943 and 1944, based on the estimates prepared for 1942-43. Besides these demands on the United States of America there were many others in addition, which arose from the fact that several orders placed in the United Kingdom before Lease/Lend arrangements were introduced, were also subsequently diverted to the United States of America. Thus Export/Import Branch in addition to dealing with the orders and estimates referred to above at (i) and (ii) also dealt with various other demands for which orders were originally placed on the United Kingdom but subsequently diverted to the United States of America.

SUPPLIES AGAINST LEASE/LEND

Actual supplies against Lease/Lend demands were not received in India in any quantity until late in 1943 when fairly large shipments of materials began to arrive. In the majority of cases, Lease/Lend Government stores were accommodated on arrival in the Medical Store Depot, Bombay, where they were unpacked, checked and afterwards distributed between civil and military organisations in accordance with instructions issued by the Export/Import Branch. All shipping documents together with copies of certified vouchers from the receiving depot were furnished to the Deputy Chief Audit Officer (American Purchase) through the DFA(O).

Transit Depot: A transit depot for handling the distribution of imported stores from the United Kingdom and the United States of America was formed in Bombay in the year 1942 under the control of the Supply Department. This depot was in the charge of a military officer. All the stocks received from the United Kingdom and the United States of America were distributed on the basis of demands and allocations for civil and military. Stores pertaining to civil indents and trade were despatched to the Medical Store Depot, Bombay, for further disposal. Issues of stores received under Lease/Lend were debited to civil budget. These debits were raised by the Controller of Supply Accounts, Bombay, against the Accountant General, Bombay. Considerable delay, however, occurred during the war in pricing of vouchers and furnishing the same to the depots concerned by the transit depot.

Trade Requirements: The eligibility of civil trade in India for Lease/Lend was admitted by the United States of America in respect of essential items only. The responsibility of indenting on behalf of the trade was entrusted to the Government. A separate Lease/Lend Depot for medical stores which was necessitated as a result of this decision was, however, not available and the accounting and control of such supplies had to be taken up by the Medical Store Depot, Bombay. All this work was later transferred in 1945, to a new department of the Government of India known as Civil Supplies Department.

TRANSFER OF WORK RELATING TO EXPORT-IMPORT AND LEASE/LEND TO THE SUPPLY DEPARTMENT

In September 1943, transfer of work relating to export and procurement of medical stores from the United States of America under Lease/Lend was made to the Directorate General Supply (Medical Division). The decision was given effect to in November 1943.

CONTROL OF EXPORTS

Severe restrictions on the export of medical goods from India were imposed soon after the outbreak of the war and the administrative control of these restrictions was vested in the Supply and Commerce Department. At a later stage the DGIMS was made responsible for advising these departments. Early in 1942, the volume of these references became so great that it became clear that the then existing arrangement was unnecessarily cumbersome and that so far as export control was concerned there would be considerable reduction in duplication of work and consequently saving of time and energy if the DGIMS was made the Export Licensing Authority for medical stores. This was agreed to with effect from May 1942.

CONTROL OF IMPORTS

From the beginning of the war it was clear that imports of medical stores was bound to be a difficult problem, firstly owing to the limited shipping space available and the urgent necessity of conserving what space there was for absolutely essential articles, and secondly to the diminution in the number of countries from which medical stores could be imported, these being limited for all practical purposes to Great Britain and the United States of America.

During the first two years of the war, no doubt partly due to lack of appreciation of the true position and consequent failure to co-ordinate action with regard to imports as a whole, licences for the import of drugs were freely issued, often with little or no investigation of the circumstances involved.

Early in 1942, it was realised that it was necessary to reduce the volume of imports into India considerably, and consequently all open general licences for the importation of medical stores were cancelled in June 1942. The system introduced to replace open general licences to import was different in the case of imports from the United Kingdom and those from the United States of America. So far as imports from the

United Kingdom were concerned it was agreed between the Department of Commerce and the DGIMS on the one hand and the Medical Adviser to the Secretary of State for India on the other, that the Controller of Exports in the United Kingdom would sanction exports on the basis of a priority list of essential items to be furnished by the DGIMS and that import licences would be formally issued by the Chief Controller of Imports in India following receipt of advice from London of the articles sanctioned for export. This arrangement was originally intended as a temporary one which was to remain in force until a workable licensing system on a quota basis could be devised. It subsequently proved to be virtually impossible to arrive at a satisfactory basis for quotas owing to the absence of detailed and comprehensive statistics of former imports of medical stores, and the system originally introduced as a temporary one became more or less permanent. However, the possibility of a licensing system on an equitable quota basis was not then completely abandoned and an effort was made in the Export/Import Branch to complete a survey of imports of medical stores on All-India basis. In this connection a comprehensive questionnaire was issued to importing firms in June 1943.

With regard to imports from the United States of America, licensing on the basis of previous imports was unavoidable since for obvious reasons it was impossible to introduce an arrangement analogous to that made with the United Kingdom. Applications from importers for special licences to import from the United States of America were, therefore, dealt with by the Chief Controller of Imports, acting under advice of the DGIMS.

CONTROL OF THE IMPORTS OF QUININE AND OTHER ANTI-MALARIAL REMEDIES

With the fall of Java the main source of supply of quinine was cut off. Supplies in relatively small quantities continued to arrive from the United Kingdom and to a lesser extent, from the United States of America.

In order to prevent hoarding of quinine by the trade, all imported consignments of quinine of any size were frozen on arrival by the DGIMS and where necessary requisitioned by government. Supplies thus obtained were utilised to augment government stocks of quinine which were then distributed in the best interests of the country.

CHAPTER VIII

Accounts and Budget

Accounting Procedure: All matters pertaining to accounting of stores including factory accounts, accounting of receipts and issues of stores, pricing, writing off losses and compilation of profit and loss accounts of Medical Store Depots and factories under the Director General, Indian Medical Service were governed during the war by orders issued by the Military Accountant General and in accordance with the Manual of "Store Accounting Instructions." Compilation of profit and loss accounts of each depot and factory was also continued during the war.

The Medical Store Depots during the war were run on quasi-commercial lines as before the commencement of the war. Profit and loss accounts for the transactions of each depot were prepared annually by the depot accountant who got copies of receipt and issue vouchers, expense vouchers, loss statements as soon as any transaction took place. All receipt and issue vouchers showed separately new, second-hand and unserviceable articles. All vouchers had to be priced and the pricing checked by the audit authorities.

On the transfer of Army Medical Stores to DMS no profit and loss accounts were prepared in respect of the newly organised Army Medical Stores (India) which maintained only quantitative accounts and were not run on quasi-commercial lines like the depots under the DGIMS.

Annual Profit and Loss Accounts: The Medical Stores Department until its transfer to the civil charge in June 1943, was financed from Defence Estimates. All funds for the purchase of stores, the pay of staff, etc., were sanctioned by the Defence Department on the recommendation of the Financial Adviser, Military Finance, who controlled the Medical Stores Department budget. All the accounting transactions were made by the Military Accounts Department.

All supplies to the army and to the Defence Services from the Medical Store Depots under the DGIMS were considered free issues till 31 May 1943 and all issues to civil governments and other public bodies were made on payment. The receipts as a result of supplies to the civil were taken in the profit and loss accounts as credits and issues to the military as debits to the Defence Estimates.

A separate profit and loss account was prepared for a factory where one existed. After audit by the Local Audit Officer and scrutiny by the Area Controller of Military Accounts, the profit and loss account of a depot or a factory reached the Military Accountant General by 15 August each year.

Issues: All issues were priced as shown below:—

(a) Stores issued to depots, factories or workshops for manufacture or maintenance—at PV rate less 1/6th.

(b) Issues to other Medical Store Depots in India—at PV rates less 1/6th.

(c) All other issues whether to civil governments, Indian state forces or to non-government institutions—at the rates published in the PVMS to which were added the following:—
  (i) excise duty where applicable,
  (ii) transportation charges such as postage, rail freight, cart and coolie hire and the cost of any special packings and containers used.

Pre-payment Issues: Medical stores supplied by the Medical Store Depots to local and private bodies as well as Indian states, etc., were dealt with under the pre-payment system whereby the parties estimated the cost of stores required by them at the PV rates *plus* 40 per cent. to cover probable cost of all containers, packing, freight, excise duty etc. They then remitted the amount into a Government treasury to the credit of the Controller of Military Accounts of the command concerned. The Depot Accountant concerned maintained accounts of each indentor. All credits and debits were as far as possible finally adjusted before the end of the financial year.

Surplus, Obsolete and Unserviceable Stores: After the close of each year, the depot authorities had to furnish to the Depot Accountant with separate lists of obsolete and unserviceable stores on hand indicating where necessary the estimated or approximate rates against each article. The Depot Accountant had to price the articles and return the lists to the depot. The book value of obsolete and unserviceable stores as given in the list and also the approximate amount likely to be realised on sale as estimated by the depot were shown separately in the profit and loss accounts. The surplus or obsolete stores in question were disposed of by auction or by any other method in consultation with the Director of Contracts, Army Headquarters. In the case of obsolete medical stores returned by military institutions no credit was afforded. The actual sale proceeds of such stores, however, were taken into account in the profit and loss accounts.

Civil and non-government institutions were oridnarily not permitted to return unserviceable and obsolete stores. If for any reason such stores were returned to the Medical Store Depots, credits were allowed to the charges at the actual sale value or scrap value of the articles less the expenses incurred in breaking up the articles or preparing them for sale.

Interest: Interest at the latest available rate published by the Accountant General was calculated on the average of the opening and closing balances of the capital assets and was debited in the profit and loss account.

Depreciation Charges: Depreciation on plant and machinery held on charge of the depot and the workshop was assessed and stores in profit and loss statement were made on the opening balance on the first day of April. When an item of capital asset had run through its prescribed life and had depreciated below 1/10th of its original value and when the depreciated value of any capital article reached Rs. 200/- or below, whichever was less, it was transferred to the unpriced inventory, its residual value being charged to revenue and a corresponding credit afforded to the depreciation reserve fund.

Mobilisation Reserves: The value of mobilisation reserves held on charge by Medical Store Depots was not included in the opening and closing balances in the profit and loss accounts. Mobilisation reserve stocks were accounted for by the depot in ledger cards. The value of such stores on 31 March was worked out by the Depot Accountant every year and shown separately in the profit and loss accounts. All issues to and receipts from mobilisation reserves for purposes of renewal or turn over were treated as issues to or receipts from military departments and shown accordingly in the profit and loss accounts.

Comparison of Working Costs: With a view to comparing the working costs of the Medical Store Depots for a particular year under review with those of the previous years the following information was given in the form of notes in the profit and loss accounts:—

(i) The main causes for profit or loss during the year under review.
(ii) The causes for variation in profit or loss as compared with the previous year.
(iii) The causes of variation between the opening and closing balances of stocks during the year.
(iv) The capital expenditure incurred during the year.
(v) The value of issues to the various Provincial and Central Government departments working up to the total value of issues shown under credits by sales to local and foreign governments.
(vi) The value of stores in transit on 31 March.
(vii) The specific reasons leading to profit or loss to be explained in a statement.

Consolidation of Profit and Loss Accounts: The profit and loss accounts rendered by Controllers of Military Accounts were checked and consolidated in the office of the Military Accountant General.

COST OF VARIOUS FIELD MEDICAL UNITS IN THE INITIAL STAGES OF THE WAR

The full details of the cost of equipment in raising various additional medical units during the initial stages of the war, such as, field ambulances, field hygiene sections, casualty clearing stations, convalescent depots, general hospitals, etc., was published by the Government of India, Defence Department, in November 1940.[1] The cost of the equipment was calculated under different headings, namely, ordnance and clothing, MES and medical and classified separately according to whether the cost was debitable to Indian Revenues or the Government of the U.K.[2]

PROCEDURE REGARDING BUDGETTING AND CONTROL OF EXPENDITURE DURING THE WAR

The Controller of Supply Accounts, New Delhi (instead of the Controllers of Military Accounts of the areas concerned) was responsible from November 1941, to pay all bills of contractors for indigenous stores procured and supplied to medical stores through the purchase branch, which was controlled by the Supply Department from July 1941. The actual expenditure was booked direct to the Defence Services head, viz., 3A, till 31 May 1943 and to the head " 87-Capital Outlay on Schemes of State Trading " from 1 June 1943.

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[1] Letter No. Z—21632/1 (DMS) 2 (a).
[2] See Appendix XII.

Provision for stores stocked in the depots for issue on behalf of the Central Provision Office (Eastern Group Supply Council) was made in the budget of the Defence Department by the Military Finance on the basis of demands prepared by the Controller General, Army Provision, Central Provision Office.

Owing to the changes in the administrative control of the Medical Stores Department of the DGIMS from military to civil from 1 June 1943, and to the transfer of audit and accounts control from the Controller of Military Accounts to the Civil Accountants General of the Provinces concerned from 1 October 1944, a certain amount of dislocation in the accounts work of the depots and factories took place during the year 1944-45, the Accountant General, Central Revenues being the final compiling authority of all the accounts of the depots received from the various provincial Accountants General. During 1943-44, the Accountant General, Central Revenues was not able to adjust the debits for expenditure raised by the Controller of Military Accounts, Southern Command, Poona, under all the detailed heads for want of compiled accounts from the latter. This resulted in all the debits for 1943-44 being kept pending for adjustment during 1944-45. Before transfer of the Medical Stores Department from military to civil charge on 1 June 1943, the value of all medical stores received in the depot was debited to defence estimates and credit for recoveries from indentors was afforded to the same estimates. From 1 June 1943, however, the Medical Store Depots came under the control of the Education, Health and Lands Department of the Government of India and the expenditure on medical stores was debited to a separate head in the Civil Budget, viz., " 87-Capital Outlay on Schemes of State Trading connected with War."

Adjustment of the Cost of Manufactured Articles issued to Military through the Medical Stores Inspection Depots by Medical Store Depots: Stores manufactured in the factories for the Central Provision Office (Eastern Group) and the Local Provision Office i.e., military requirements in India of the DMS from 1 June 1943 were made over to the Medical Stores Inspection Depots concerned for despatch to the Army Medical Stores (India) or the consignees concerned of the Central Provision Office. These stores manufactured by the factories were not brought into account in the depot stocks but were issued direct to the Officer Commanding, Medical Stores Inspection Depot concerned from the factories on delivery vouchers.

Financial Implications of Expansion—Budget Provision by the DMS—Medical Stores Budget (Military) 1942-43: In order to comprehend the financial implications of the expansion of medical stores supplies during World War II, it may be noted that the annual budget of the Medical Stores Department for purchases of stores both imported and indigenous which was in the region of approximately Rs. 30 lakhs before the commencement of the war i.e., during 1938-39 for both civil and military requirements was raised approximately to Rs. 30 crores for military requirements alone within four years of the onset of the war as would be evident from the Budget Provision by the DMS for military stores required for the year 1942-43 *plus* some of the military commitments which were then still in the hands of the DGIMS waiting to be completed. This would show that more than a hundred-fold expansion in the matter of medical stores had occurred during World War II. Financial implications of further expansion under the DMS would be referred to latter.

A brief summary of the expenditure incurred on the procurement of medical stores by the Medical Stores Department during the period 1939-43 is given below:—[3]

1939–40

(1)	(2)	(3)	(4)	(5)
Depots	Value of stores imported	Value of stores purchased locally	Value of stores purchased from other depots	Total
	Rs.	Rs.	Rs.	Rs.
MSD Madras ..	4,14,652	6,29,891	2,09,142	12,53,685
MSD Bombay ..	2,06,409	7,90,187		9,96,596
MSD Calcutta ..	1,19,274	5,59,209	1,94,581	8,73,064
MSD Lahore Cantt.	3,92,781	8,00,000 Approximately	3,59,008	15,51,789
	Total for all the depots for 1939-40 ..			46,75,134

1940–41

(1)	(2)	(3)	(4)	(5)
	Rs.	Rs.	Rs.	Rs.
MSD Madras ..	5,63,203	14,10,242	8,85,549	28,58,994
MSD Bombay ..	5,72,524	34,71,796		40,44,320
MSD Calcutta ..	1,15,489	25,60,948	2,75,206	29,51,643
MSD Lahore Cantt.	4,54,986	24,54,746	12,24,583	41,34,315
	Total for all depots for 1940–41 ..			1,39,89,272

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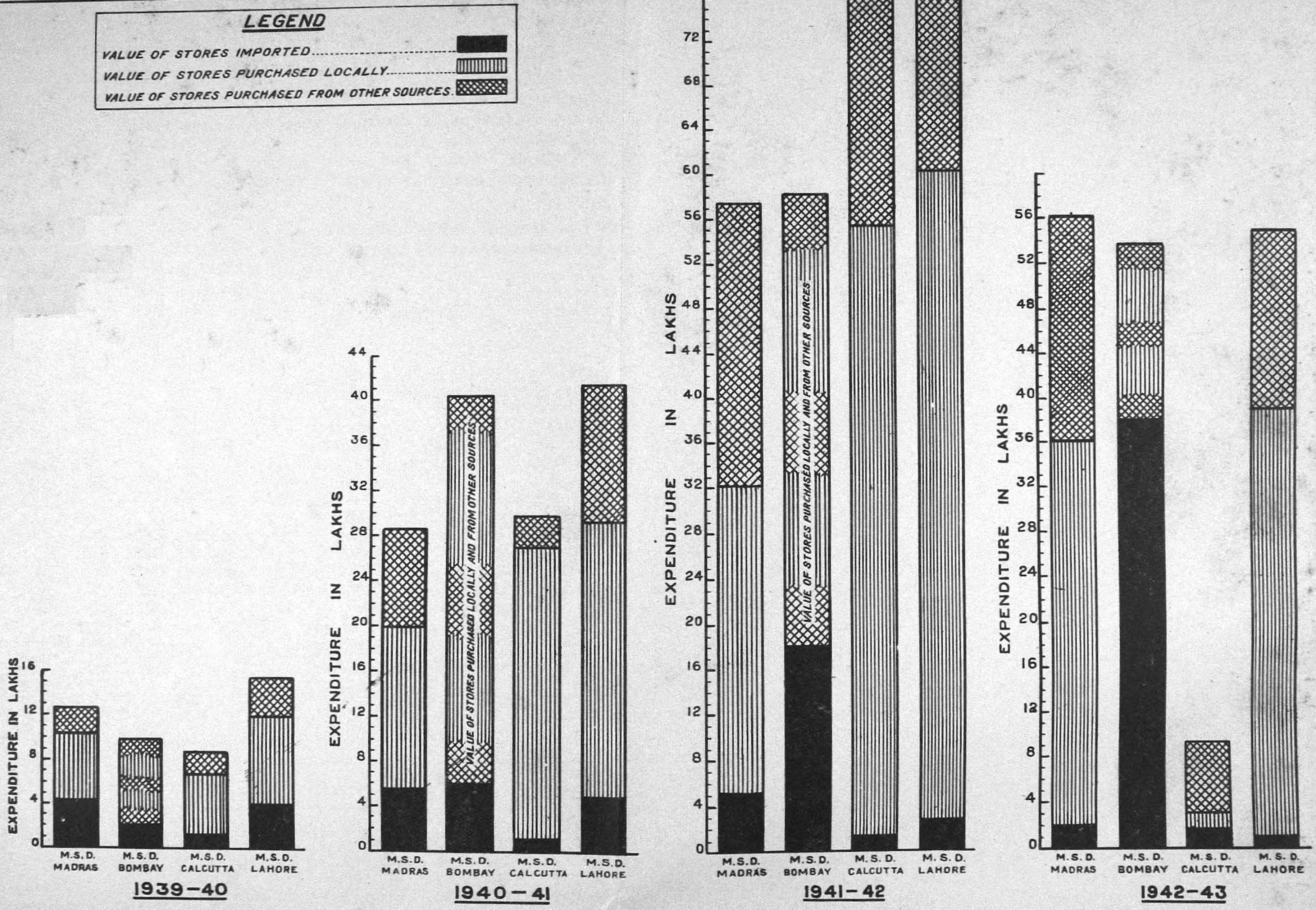
[3] Chart illustrating it faces page 185.

EXPENDITURE INCURRED ON THE PROCUREMENT OF MEDICAL STORES BY THE MEDICAL DEPARTMENT DURING THE PERIOD 1939-43.



1941-42

(1)	(2)	(3)	(4)	(5)
Depots	Value of stores imported	Value of stores purchased locally	Value of stores purchased from other depots	Total
	Rs.	Rs.	Rs.	Rs.
MSD Madras ..	5,21,640	27,23,833	25,13,026	57,58,499
MSD Bombay ..	18,19,895	40,25,898		58,45,793
MSD Calcutta ..	1,16,434	54,41,633	21,82,669	77,40,736
MSD Lahore Cantt.	2,85,785	52,79,513	22,23,324	77,88,622
	Total for all depots for 1941-42 ..			2,71,33,650

1942–43

(1)	(2)	(3)	(4)	(5)
	Rs.	Rs.	Rs.	Rs.
MSD Madras ..	1,94,219	34,48,923	19,94,782	56,37,924
MSD Bombay ..	38,31,521	14,66,860		52,98,381
MSD Calcutta ..	1,49,416	1,51,499	6,13,674	9,14,589
MSD Lahore Cantt.	89,641	37,88,540	16,36,778	55,14,959
	Total for all depots for 1942–43 ..			1,73,65,853

Summary	*Total expenditure on the purchase of stores*
1939–1940 ..	.. Rs. 46,75,134
1940–1941 ..	.. Rs. 1,39,89,272
1941–1942 ..	.. Rs. 2,71,33,650
1942–1943 ..	.. Rs. 1,73,65,853

NOTE: The above figures do not include expenditure on war reserves[4].

The fall in expenditure during 1942-43 in the Medical Stores Depots under the DGIMS was due to the fact that the expenditure incurred was mainly on account of civil requirements except in the case of Bombay and Lahore depots which were still busy completing their military liabilities in connection with field medical equipment before the final transfer of all stores from the depots of the DGIMS to the Army Medical Stores.

BUDGET PROVISION BY THE DMS

As already referred to in the previous sections the DMS in India undertook the entire provision for the Army Medical Stores required

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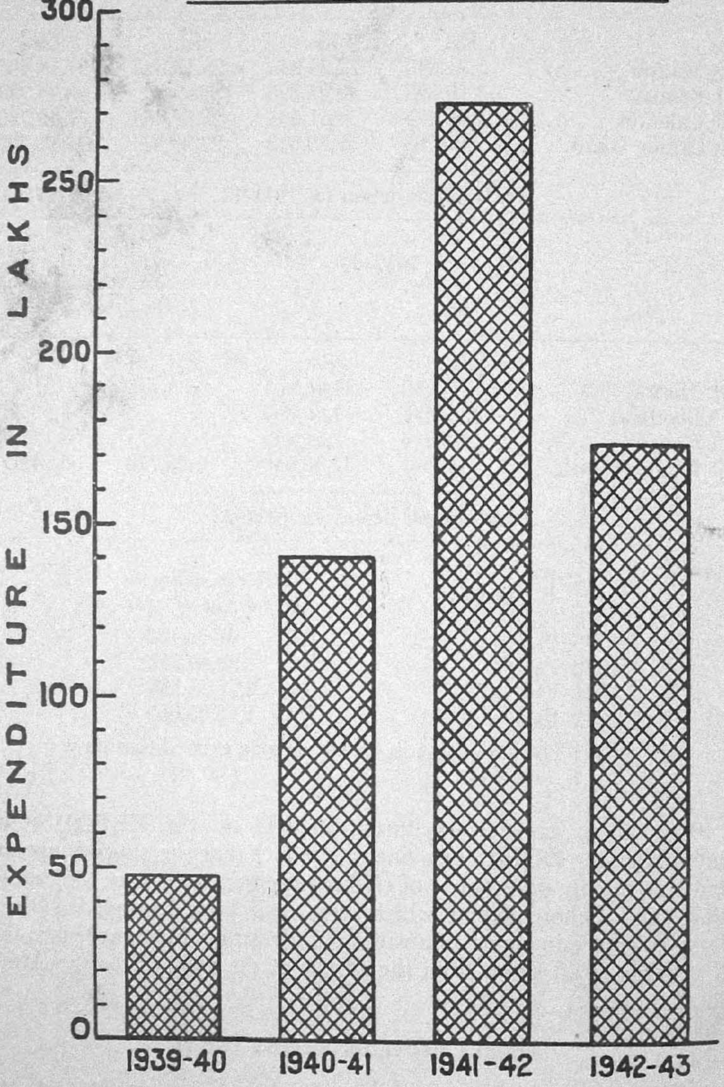
[4] For Chart illustrating it see page 186.

TOTAL EXPENDITURE ON THE PURCHASE OF MEDICAL STORES

DURING THE PERIOD 1939-43.



NOTE:- EXPENDITURE ON WAR RESERVES IS NOT INCLUDED.

for the war with effect from September 1941. In November 1941, the DMS in consultation with the military financial authorities published his first medical stores budget (military) for 1942-43 under his UO No. 3115/DMS 2(b) dated 20 November 1941[5]. The financial implications of this budget were briefly as follows:—

India		
Total purchases in India ..	Rs.	6,61,30,000
Total purchases from overseas	Rs.	6,93,89,000
Total purchases under Lease/Lend	Rs.	11,50,000
Grand Total for India ..	Rs.	13,66,69,000
CPO		
Total purchases in India ..	Rs.	13,24,44,000
Total Military Budget ..	Rs.	26,91,13,000

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[5] See Appendix XIII.

CHAPTER IX

Conclusion

Reference has been made in some detail in the foregoing pages to the various problems of medical stores supplies met with during the war. In this chapter it is proposed to review very briefly the main problems and difficulties which confronted the Medical Stores Department during the first three and a half years of the war and the steps taken to overcome them. Problems may be classified under the following heads:—

(1) *Administrative problems* in general including war-time changes in the administration of the Medical Store Depots and factories.
(2) Problems connected with the *supplies* of medical stores, military and civil.
(3) Problems connected with *provisioning.*
(4) Problems connected with the *procurement* of both imported and indigenous stores.
(5) Problems connected with the *development of indigenous production* under the DGIMS.
(6) Problems connected with the *inspection* of medical stores.
(7) *Problems* connected with *storage* and *accommodation in depots and factories.*
(8) *Accounting* problems.
(9) Problems of controlling the *purity and standards of drugs.*
(10) *Administrative problems in general.*

All medical equipment required during the war by the military with very few exceptions was ordered, held on charge and issued by the DGIMS until a separate organisation viz., the Army Medical Stores was established directly under the DMS towards the latter part of 1942 and early in 1943. Difficulties were experienced in obtaining adequate medical stores in India from the United Kingdom to meet the rapid expansion of the army in India and the increasing demands for medical stores received from overseas for the Middle East and Far East Forces operating in those theatres. The DGIMS acted as the central authority for planning, procuring and stocking of medical stores at the Medical Store Depots at Bombay, Madras, Calcutta and Lahore Cantonment and later at Karachi. The Medical Store Depots at Madras and Bombay had factories attached to them for the manufacture of approximately four hundred items of drugs and dressings which increased later on to over six hundred. A workshop was also attached to the Medical Store Depot, Madras, to repair surgical instruments and appliances. During the war the manufacturing activities of these depots increased considerably. So far as the civil indentors were concerned supplies to them were made on the basis of programmes drawn up beforehand. The system of provisioning and procurement for the forces underwent frequent changes to meet the exigencies of the war. In order to cope with the increasing military demands the staff of the DGIMS's office and at the depots and the factories had to be increased considerably and many new additional depots, sub-depots and transit depots to stock and issue stores had to be established. Changes in the administrative control of the Medical Store Depots and factories also occurred by transferring the responsibility for administration from the Defence Department to the Supply Department in April 1941, and from Supply Department to the Department of Education, Health and Lands from June 1943.

CENTRALISATION OF PURCHASES

The transfer of control to the Supply Department resulted in arranging purchases centrally in view of the following difficult conditions prevailing in India:—

(a) Shortage of medical stores with the trade.
(b) Shipping difficulties from the United Kingdom and the necessity for long-range planning.
(c) The need for transferring many medical store items from the imported to the indigenous category and in this connection the necessity of giving assistance and encouragement to various manufacturing firms in India to step up production.
(d) Inland transport difficulties, etc.
(e) Checking of inflationary tendencies in prices.

Separation into Civil and Military: Towards the end of 1941, the DMS undertook the responsibility for provisioning of medical stores required for the armed forces and during the latter half of 1942 of stocking his stores in his own depots, the accommodation for which was provided in the beginning by the DGIMS from hired buildings.

Thus the DGIMS was left to deal with civil requirements which also had increased considerably during the war. The change-over from the Defence Department since June 1943, to the civil charge caused the expenditure on purchases of stores and on administration of the depots and the factories to be met from the civil budget instead of the military budget.

CPO Commitments: With the establishment of the Eastern Group Supply Council and the Central Provisioning Office (for overseas requirements) under the Controller General of Army Provision (India) in 1941, the responsibility of holding medical stores in the depots for distribution to troops overseas and to Eastern Group countries devolved on the DGIMS. This activity continued throughout the war. The Medical Store Depots, under the DGIMS (particularly the Medical Store Depot, Bombay) were made the main issue depots for overseas requirements and in this connection a Transit Clearance Depot at Bombay had to be established to accommodate the consignments for overseas before they were taken over by the embarkation commandant.

CPO Reserves: The then existing depots could not accommodate all the CPO reserves and a new depot was constructed at Raipur (over four lakh square feet in area) to accommodate both the reserves of the DMS and the Central Provision Office.

Expansion in Depots and Factories: A new Medical Store Depot was established at Karachi and an ARP reserve depot at Karnal. Also several sub-depots had to be established at Mahim (Bombay), at Worli (Bombay), at Jafarsarang (Madras), at Ahmedabad, etc.

New factories were established, namely, Shell Dressing Factory at Royapuram (Madras) and Medical Stores Factory at Chheharta (Amritsar) in addition to the considerable expansion of the then existing factories attached to the Medical Store Depots, Madras and Bombay.

Cold Storage Sub-depots: Cold storage sub-depots for the preservation of rubber articles were established in the hills, viz., at

(1) Sabathu (Simla Hills)—1937 sq. ft.
(2) Jalapahar

Export/Import Organisation: An Export/Import Organisation was established in Stores Section of the office of the DGIMS to deal with demands for Lease/Lend Stores and certain categories of U.K. stores. The DGIMS was also made Export Licensing Authority for medical stores in May 1942.

Inspection: The responsibility for inspection of medical stores was transferred from the DGIMS to the Controller General of Inspection to keep in line with the transfer of responsibility for the purchase of stores to the Supply Department and the establishment of the Central Purchase Organisation.

PVMS: The entire priced vocabulary was revised during the war with the result that over 800 items were deleted and as many new items were introduced.

Separation of Stocks into Civil and Military: Medical stores required for both civil and military purposes were stocked together during the first two-and-a-half years of the war. Although in 1941 the stocks in depots were divided and accounted for separately as civil and military no actual physical separation was made. This was followed by physical separation and transfer of military stocks to the newly established Army Medical Store Depots.

Delays in Supplies by the Central Purchase Organisation and Consequent Shortage of Civil Stocks: Considerable delay occurred in procuring stores by the newly established Central Procurement Organisation on the basis of the demand submitted to the Supply Department in 1941 and 1942 and civil stocks of the depots fell below the prescribed working margin. The problem of serious shortage of stores in the depots and procurement of the stores by the Supply Department was investigated by a Special Committee known as the Bedaux Committee, which decided on special action being taken to deal with the shortages in the working stocks of the depots and to meet the growing demands of civil indentors by sanctioning special demands for both indigenous and imported stores and a reserve of raw materials for the factories for early procurement action by the Supply Department.

Transit Depot: A Transit Depot for handling and distributing imported stores from the United Kingdom and from the United States of

America was formed in Bombay in 1942. This was in charge of a military officer. All the stores received from the United Kingdom and the United States of America were distributed on the basis of demands from and allocations to civil, trade and military.

PROBLEMS CONNECTED WITH SUPPLIES OF MEDICAL STORES—MILITARY AND CIVIL

(a) *Expeditionary Forces:* At the outbreak of the war, various expeditionary forces had already been moved and were being moved overseas both to the Far East and to the Middle East. The Medical Store Depots were engaged in the supply of initial medical equipment and building up reserves for the expeditionary forces. As no prior forecast could be made by the DMS it made the task of the DGIMS for provisioning very difficult as stores had to be obtained at short notice and in many cases at the expense of stocks held on behalf of the civil. Indents from the Middle East and Far East assumed enormous proportions as the war progressed.

The vast and sudden increase in military commitments was met by the following measures:—

(i) Doubling of store margin (working stocks) of indigenous items from three months to six months and of imported articles from six months to one year. During the War of 1914-18 stock margin was permitted to the extent of two years' stocks of imported articles and one year's stocks of locally purchased articles.

(ii) Substantial increase in the War Reserve stocks was arranged by placing the stock lag (War Reserve) Indent for medical and veterinary equipment and stores on the India Store Department, London, for immediate compliance. This indent alone was worth over Rs. 14 lakhs.

(iii) Standing war indents were revised and amplified and their immediate compliance arranged.

(iv) Local resources in India were utilised to their utmost and reserves for the forward programme of the DMS rapidly collected by enhancement of financial powers of the DGIMS and officers-in-charge of the Medical Store Dèpots.

(v) Extra staff and accommodation was arranged as required.

(b) *Field Medical Equipment:* The DGIMS was entrusted at the commencement of the war with construction and fitting up according to the latest mobilisation equipment scales, field medical panniers, and field boxes with their contents for general hospitals, field ambulances, casualty clearing stations, ambulance trains and hospital ships, etc., according to a very heavy programme of commitments, which had to be completed on specified dates at short notice.

Measures taken: The depots at Bombay and Lahore Cantonment were mainly entrusted with the work of fitting up field medical units where technical labour was available whereas the factories at Bombay and Madras worked double-shift and produced the required tablets, pills and field dressings, etc. Difficulties were, however, experienced in securing instruments and appliances of the requisite standard locally, in limited time and very often the war reserves had to be encroached upon to supply the deficiencies.

(c) *Forward Programmes of the DMS:* Huge quantities of medical stores as a reserve against the forward programme of the DMS in relation to the expansion of the army had to be collected by the DGIMS in terms of special units viz., ' Us ' (one U representing the requirements of one division for one month of expendable stores) and ' UBs ' (one UB representing the requirements of non-expendable stores for one division for six months). It may be pointed out in this connection that the authorised scales laid down for ' Us ', ' UBs ' and also Medical Mobilisation Equipment Scales were frequently changed by the DMS. This led to constant difficulties and the collection of stores for building up reserves and for field units at a rapid pace became a formidable task.

Action taken: Vigorous steps were taken by all the Medical Store Depots to collect in record time the reserves (in terms of ' U ' lists) and in this connection the preliminary extensive survey of the resources of the country, organised by the DGIMS served a useful purpose.

(d) *Increase in Civil Commitments:* This was due to more and more civil institutions approaching the DGIMS for help owing to the increasing difficulties of obtaining medical stores, both imported and indigenous, from the trade in India. The increase in civil commitments during the war was due to demands from the following:—

(a) Railways
(b) Local Fund Hospitals
(c) Indian States
(d) Ordnance Factories, Training Centres under the Labour Department
(e) Red Cross, etc.

Measures taken: New civil commitments during the war were undertaken by the DGIMS on certain terms and conditions viz., that a minimum of two years' notice must be given by new indentors before they discontinued indenting on the Medical Stores Department, and that the supplies to non-government institutions would be made on a prepayment basis. These precautions were taken to avoid loss to the State. In the case of Indian States it was decided only to supply them with certain essential articles and not all items in the PV of medical stores.

(e) *CPO Commitments:* With the establishment of the Eastern Group Supply Council and the Civil Provisioning Office under the Controller General, Army Provision (India) in 1940, the responsibility of holding medical stores on behalf of the Civil Provisioning Office for supply to troops overseas and supplies to Eastern Group countries devolved upon the DGIMS. This was an important stores activity of the DGIMS throughout the war.

Measures taken: The Central Provision Office commitments rapidly assumed enormous proportions and became a major problem of the department. The Medical Store Depot, Bombay, was made the main issue depot for overseas and a transit clearance sub-depot at Bombay had to be established to accommodate consignments before they were handed over to the Embarkation Commandant. As the existing depots could not accommodate all Central Provision Office reserves a new depot was established at Raipur (over four lakh sq. ft. in area) to accommodate both the reserves of the DMS and the Central Provision Office.

PROBLEMS OF SUPPLIES OF EXPORTS AND IMPORTS

With the extension of Lease/Lend facilities particularly in respect of medical stores the DGIMS was called upon to furnish estimates and forward-programmes of medical stores for all requirements in India including government, civil, military and trade and later to control the distribution of supplies when received. Subsequently it was decided that the DGIMS should be responsible for advising the Department of Commerce and Supply in respect of import and export of medical stores.

Control of Exports: With the introduction of restrictions on the export of medical stores all applications for export licences in respect of medical stores were forwarded to the DGIMS for advice. Such references gradually increased in volume.

Import Trade Control: This presented innumerable difficulties owing to non-availability of sufficient shipping space due to the urgent necessity of conserving it for absolutely essential articles. During the initial period when the shipping problem was not so acute, import of essential drugs was freely licensed. It, however, became necessary soon to reduce by considerable amount, the volume of imports to India and because of this all open general licences for importation of medical stores were cancelled in June 1942. As regards importation from the United States of America, it was necessary to issue licences on the basis of previous imports since it was impossible to introduce an arrangement analogous to that made with the United Kingdom. Applications from importers for special licences were dealt with by the Chief Controller of Imports in accordance with the advice of the DGIMS. The main difficulty in solving this problem was the absence of comprehensive statistics and details of medical stores, imported in peace years.

An export and import organisation was established in the stores section of the office of the DGIMS to deal with demands for Lease/Lend stores, etc. The DGIMS was also made the export licensing authority for medical items in May 1942. Later on the work in connection with the issuing of licences for imported medical stores which required scrutiny of applications and of bulking the demands for medical stores for trade was entrusted to the Industries and Civil Supplies Department.

PROBLEMS OF SUPPLIES OF QUININE AND ANTI-MALARIA DRUGS DURING THE WAR

Although a large indent for quinine was placed on Java at the commencement of the war (a) on behalf of the Government of India, to replenish their reserves, for civil needs, (b) for military needs and (c) for the needs of the Eastern Group countries on behalf of Central Provision Office, this indent did not fully materialise with the result that there was a great shortage of quinine. India's annual production in the plantations in Assam and Nilgiris amounted only to about 80,000 lb. against 2,10,000 lb. representing the bare needs of the civil population alone per year. The position regarding quinine thus became precarious during the war. As regards other anti-malarial drugs viz., atebrin and plasmaquine, the supplies were limited and were hardly sufficient for the requirements of the army and the civil during the earlier years of the war. A special conference was held by the Government of India in 1942 as a result of which the distribution of quinine was strictly controlled. Various economy measures in the use of quinine were also adopted, and the use of substitutes introduced, viz., mepacrine hydrochloride (Atebrin). The entire control of provisioning and distribution of civil requirements of anti-malarial drugs was taken over by the Education, Health and Lands Department, Government of India, although the Medical Stores Depots still played the part of stocking and distributing anti-malarial drugs to provinces and other indentors according to the instructions received from the Government from time to time. Ampouling of quinine was also introduced.

Pyrethrum and DDT: These were entirely restricted for military use during the war owing to their limited production. As pyrethrum extract was required in large quantities the production of this in Medical Store Depot factories was increased to its maximum capacity. Assistance of certain reliable firms was also enlisted. About the close of the war the restrictions on the use of pyrethrum for civil requirements were removed.

Storing and Provisioning

The three sets of stores, viz., civil, military and Central Provision Office, were thus accounted for by the DGIMS in different coloured ledger cards, white, pink and yellow, involving preparations of approximately 12,000 ledger cards in each depot.

Provisioning of medical stores for both civil and military requirements was combined under the DGIMS for the first two years of the war. Apart from the original lack of reserves it was considered that the shortages were due to the then existing system of provisioning and the DMS pressed for having his own organisation for provisioning, storage and distribution of medical stores.

A special committee of the Principal Staff Officers at General Headquarters was formed under the orders of the War Department in April 1941. Its main recommendation was that the DMS should undertake the whole function of provisioning and the DGIMS should continue to hold stocks. As regards supplies of stores from overseas the committee recommended that automatic shipments from the United Kingdom should be obtained on a percentage or quota basis of United Kingdom production. Further in response to the desire of the DMS to control his own stocks the depots of the DGIMS had to transfer their military stocks to the newly formed Army Medical Stores as and when accommodation became available. All this was done piecemeal and by stages and thus separation between the civil and military stocks was continued for several months. Transfer of these stores to the army, produced a certain amount of dislocation in the accounting work of the depots.

PROBLEMS CONNECTED WITH PROCUREMENT OF BOTH IMPORTED AND INDIGENOUS STORES

Imported Stores: Owing to shipping difficulties from the United Kingdom, there was considerable increase in the time lag for procurement of imported stores at the commencement of the war. This lag steadily increased. This fact added to the losses at sea, and insufficient factory production in the United Kingdom made the task of obtaining imported stores both for military and civil requirements increasingly difficult.

Measures taken (Imported Stores)

(a) India Office Medical Stores Committee was established in London for close liaison between the Medical Adviser to the Secretary of State and the DGIMS which made procurement of imported stores somewhat easier.

(b) As the United Kingdom was not able to meet the demands from India in full, procurement of imported stores from United States of America was established under Lease/Lend.

(c) Many imported items were transferred to the indigenous list as production in India advanced.

(d) Several control orders were introduced e.g., Agar Control Order, and Essential Drugs (Census) Order, etc.

Every effort was made during the war to promote the development of indigenous production.

Procurement (both imported and indigenous) was taken over by the Supply Department on 1 June 1943. The DMS took over the procurement of imported stores in July 1944.

PROBLEMS CONNECTED WITH THE DEVELOPMENT OF INDIGENOUS PRODUCTION UNDER THE DGIMS

The main question that had engaged the attention of the department was what imported drugs could possibly be manufactured in India so as to reduce imports with a view to relieve the strain on the United Kingdom. Closely related to this was the other problem of providing suitable Indian and British equivalents or alternatives for the various pharmaceutical preparations which became scarce in the country.

Measures taken

(a) Establishment of a departmental committee under the DGIMS in October 1939, to investigate the sources of supply of drugs, chemicals and biological products for the Medical Stores Department.

(b) Drugs Supply Committee was established in April 1940, as a permanent consultative committee for securing a greater production of drugs in India. This Committee later became the Medical Stores Supply Committee.

(c) Appointment of the Chief Advisory Chemist at Headquarters, appointments of Director of Production Drugs and Dressings, and Director of Production, Instruments and Appliances.

PROBLEMS CONNECTED WITH INSPECTION OF MEDICAL STORES

With the increasing volume of indigenous stores the problem of inspection and testing chemical and biological products before they were passed fit for use became increasingly difficult and although the DGIMS had at his disposal the analytical laboratories of the Medical Stores Department, the Biochemical Standardisation Laboratory and the Central Research Institute, Kasauli, etc., it became impossible to cope efficiently with the whole problem of inspection of supplies.

An inspection directorate was formed during 1941, in the MGO Branch of the Army Headquarters for all kinds of stores including medical stores and all inspection of indigenous medical stores for civil and military requirements was taken over by the CGI, and the then existing facilities of the Biological Standardisation Laboratory and other laboratories under civil control were also fully utilised.

PROBLEMS CONNECTED WITH STORAGE AND ACCOMMODATION IN DEPOTS AND FACTORIES

The problem of accommodating the huge stocks and reserves held for civil, military and Central Provision Office requirements became rapidly enormous as the war progressed although expansion in existing depots by additional buildings was arranged by the DGIMS and buildings on hire were obtained wherever possible. This measure was hardly sufficient to meet the situation and new depots had to be organised. Similar situation arose regarding the factories. Although the then existing factories at Bombay and Madras were expanded and their production enhanced to their maximum capacity, this was not enough. After availing of the resources of the trade to the utmost it was still found that the requirements were not fully met and additional government factories had to be established.

Closely allied with the problem of expansion was the question of labour troubles in factories and depots which was no doubt due to the increased cost of living with the progress of the war.

New medical store depots were established at Karachi and Raipur and an ARP reserve depot at Karnal. Also several sub-depots were established, some of which were later taken over by the DMS, Karachi Depot and one-third of the Raipur Medical Store Depot were also taken over by the DMS. New factories were similarly established viz., a shell dressing factory at Roypuram and a medical stores factory at Chheharta (Amritsar) in addition to the expansion of the existing factories.

Accounting: The entire PVMS underwent changes and revision during the war, under the direction of the DMS with the result that about 800 items were deleted, and as many new items introduced. At the commencement of the war each depot had its own pricing. This created difficulties during the war as stores had to be frequently transferred from one depot to another and the military financial authorities found the question of debiting expenditure against the U.K. Government on account of imported stores difficult owing to different PV rates obtaining at different depots.

A special chartered accountant was appointed who recommended commercialising all accounts. This recommendation was not, however, accepted by the Supply Department and military financial authorities, being impracticable and expensive. Pricing of issues which was previously done by the military accounts branch was transferred to the staff of the DGIMS under the direction of a representative of the MAG in each depot, viz., a Depot Accountant. As regards stock-accounting the military stock accounts verifiers were taken away by the Military Accountant General and were replaced by the depot staff.

Stock Verification during the War: In normal peace time the method of stock verification which was laid down both in the Store Accounting Manual (Military) and in the Medical Store Depot Manual was found to be satisfactory. During the war, however, stock vertification became a difficult task. Due to expansion, the stores had invariably to be spread out in various hired buildings as became available away from the main depots. Moreover, congestion was caused not only by stocks awaiting despatch or disposal, but also by the heavy rush of huge quantities of incoming stores. In this connection, it may be pointed out that at the commencement of the war there were two distinct stock verifiers in each depot, namely, one appointed by the depot and one appointed by the MAG. Soon after the commencement of the war, however, the MAG as stated above withdrew his stock verifiers owing to paucity of accounting staff and this deficiency was made up by appointing extra stock verifiers from the depot staff. This arrangement, although it served its purpose, was not altogether satisfactory as the military accounts stock verifiers had served a useful check on the working of the depot stock verifiers.

On account of the disposal of stores at different places accounting became increasingly difficult when it came to stock verification and was not ideal from the storekeeper's point of view. Nevertheless these Medical Store Depots functioned during the extreme urgency with an untrained and inadequate staff with amazing efficiency with practically no loss due to fraud or pilferage.

PROBLEMS OF CONTROLLING THE PURITY AND STANDARDS OF DRUGS

Soon after the war started, the Government of India enacted the Drugs Act 1940 with a view to controlling the standards of drugs which were imported or manufactured in the country, sold and distributed.

The first measure for achieving the aims of the Drugs Act was to establish the Drugs Technical Advisory Board of which the DGIMS was the Chairman. The function of this Board was to advise the central and the provincial governments on technical matters arising out of the administration of the Act and to carry out such other functions which were assigned to it by the Act. Simultaneously with the formation of the Drugs Technical Advisory Board, the Drugs Rules were prepared as laid down in the Act. The rules were considered by the Board after which they were published for public opinion in April 1944, in the Central and Provincial Gazettes. The opinions and comments received from individuals and other bodies were considered by the Board in February 1945, and their recommendations were forwarded to the Government of India with a view to their being brought into effect which was done sometime after the cessation of hostilities and reversion to peace conditions.

The foregoing narrative is a record of the impact of war upon the previously existing medical stores organisation and of the measures taken to meet the increasing demands upon it caused by the development of the military situation during the first three to four years of the war.[1]

The Medical Store Depots including those improvised and expanded, as they were during the war, were never built as storage depots for medical stores with the exception perhaps of the Bombay and Calcutta depots.

With the meagre storage accommodation available in the main depots in 1939 at the commencement of the war, the depots had expanded and met with the enormous increase of work and functioned for three to four strenuous years without any breakdown in supplies to the forces in India and overseas, dependent on them. The difficulties that had arisen were not only due to frequent changes in the organisation but were due mainly to constant expansion of depots and factories at a rapid pace necessitating extra accommodation and employment of raw untrained hands not conversant with the working of the system.

During the emergency the Medical Store Depots found great difficulty in obtaining experienced hands and although the various measures adopted to deal with the difficulties that arose during the war in connection with the provision and supply of medical stores to the civil and military proved suitable and effective it may be mentioned that the continued series of changes in administration and constitution which the department was subjected to since the commencement of the war added very considerably to the problems and difficulties.

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[1] A note on the problems and difficulties encountered by the DMS in India in connection with the supply of medical equipment and personnel (1937-1941) by Col. H.H. Brown, Dy. Director, Medical Organisation for War is given in Appendix XIV.

It is to be remembered that the war broke out at a time when the military medical equipment scales were under review and this review consequently had drastically to be expedited after the outbreak of hostilities. In addition the scale on which the hostilities developed was out of all proportion to any estimates on which provisioning had been based. In consequence the task of the DGIMS to provision for military requirements was, in the early stages, seriously complicated by frequent and sudden changes in those requirements themselves. It was also found necessary radically to revise the PVMS to bring it in line with up-to-date medical and surgical developments, a task which, undertaken as it had to be at the height of our military commitments, was a further and material addition to the difficulties experienced by the Medical Stores Department.

In the light of experience it is thought that had physical separation between the civil and military sides taken place at an earlier stage, or even at the outbreak of hostilities, the DMS would have been able untrammelled to exercise his responsibilities for provisioning and procurement of military requirements, and the DGIMS being freed of the latter been able to concentrate his attention on the establishment and maintenance of civil stocks adequate to meet his growing civil commitments.

In conclusion, it may be said that a good deal of the trouble and the difficulties experienced would have been avoided if there were one controlling authority for the whole organisation of Medical Stores Department instead of two i.e., either the DMS or the DGIMS. It would perhaps have been simpler if the DMS were permitted to take over the whole organisation during the war which would have avoided duplication and saved a large amount of extra-expense necessitated for staff and accommodation.

Lastly when considering the outcome and the lessons to be learnt in the matter of supply of medical stores and equipment mention may be made of the necessity of a regular system of turnover of all reserves to keep them fresh and up-to-date and above all of an adequate system of provisioning during war which should take into consideration the following points:—

(1) *Imported Stores:* Liberal store margin because of the increased time lag in procurement during war, delays in shipping, losses due to sinking of ships or due to other disasters such as air raids.

(2) *Indigenous Stores:* Here also an increased store margin is necessary owing to delays in procurement caused by various circumstances, namely, difficulty of obtaining priority movement for stores from one place to another, disorganisation or heavy load in railway traffic or other transport scarcity of packing materials of various types and difficulties of obtaining raw materials particularly imported ones.

(3) *New Items, Special Items or Difficult Items likely to be useful during War:* Special provision to be made and longer store margin maintained.

It is imperative that the country should be self-sufficient as far as possible and should not have to look to foreign sources (which invariably get cut off during war) in the matter of all vital needs for war including supply of medical equipment and stores.

APPENDIX I

Summary of Findings and Recommendations of the Medical Stores Department Reorganisation Committee 1939

1. That civil custom should be retained and, if possible, augmented.

2. That the criteria to be applied in judging the success or otherwise of the department's operations should not be purely commercial.

3. That no change be made with regard to the officer administering the department which should continue to be under the control of the Director General, Indian Medical Service.

4. That the Assistant Director General (Stores) should no longer be appointed by the Department of Education, Health and Lands. This appointment should rest with the Defence Department, who, in making the appointment, might consult the Department of Education, Health and Lands.

5. That the Stores Section of the Director General's office should remain as at present attached to the office proper of the Director General, Indian Medical Service, but that departmental orders of the Department of Education, Health and Lands, where they conflict with the principle of liaison, should not apply to it.

6. That the present system of financial control needs no modification. The necessity for a closer personal liaison between the officers of the Finance Department and those controlling stores supply, etc., be brought to notice.

7. That the depots at Madras, Bombay, Lahore and Calcutta be retained in their present form.

8. That the factories at Madras and Bombay be retained and no attempt be made to amalgamate them.

9. That power to supply civil customers with goods not listed in the priced vocabulary be specifically accorded to Officers-in-charge.

10. That no attempt be made to apply the 'no cost' principle as the criterion for introduction of new items into the priced vocabulary.

11. That the proposal for introducing a new item or substituting any improved item should be supported by written reasons of the Director of Medical Services and have the concurrence of the Director General, Indian Medical Service.

12. That to obviate the possibility of undue delay in introducing an item urgently required, a reserve fund should be placed with the Director General, Indian Medical Service, to permit his supplying thi item before it actually finds a place in the priced vocabulary.

13. That the need for carefully checking indents before despatch should be brought to the notice of military indenting officers.

14. That the present system of dealing with indents employed at depots be retained.

15. That the system of prepayment employed in respect of non-government civil customers be retained but where the prepayment falls short of the actual bill, this should not necessarily involve a refusal to comply with the indent.

16. That a system of variable surcharge be employed in respect of all those articles whose prices are known to be below market rate in order to make them approximate to market rate.

17. That a similar system be applied to those articles known to be above market rate to bring them into line with that rate.

18. That with respect to that intermediate group of articles whose position vis-a-vis the market is not easily ascertainable, the present 20 per cent. surcharge system be retained but, as increasing knowledge permits, the variable system be gradually extended to it.

19. That price fixation be undertaken at depots but a check be imposed by requiring Officer-in-charge to report variations to the Director General, Indian Medical Service. The Assistant Director General (Stores) should visit each depot at least once a year to supply the further check of personal supervision.

20. That no change in the priced vocabulary rate of any article be made if this rate is within 5 per cent.

21. That priced vocabulary rates as listed should include bottling and minor packing charges.

22. That the present system of appointing Indian Medical Service Officers to be in charge of depots is satisfactory but Government might consider the possibility of substituting a cadre of pharmacological chemists.

23. That the Indian Medical Service cadre employed for this purpose be kept as junior as is compatible with efficiency.

24. That no guarantee be given to officers entering the department that they will necessarily be retained for any given period of their service.

25. That the Assistant Director General (Stores) should always be the senior most officer in the ' Stores ' cadre.

26. That the hours of work in factories and the stores sections of depots be increased by 30 per cent.

27. That in consequence the inferior personnel in factories and stores sections be retrenched to the extent of 30 per cent.

28. That the savings effected as a result of this retrenchment be divided among the remainder either as an augmentation of their emoluments or as an augmentation coupled with a provident fund contribution.

29. That either a compulsory or optional form of provident fund in respect of inferior personnel be instituted.

30. That inferior personnel be not attested.

31. That the compounders be retrenched in the proportion of 10/13.

32. That the salaries of compounders be increased by ten per cent.

33. That certain reductions be made in the superior stores establishment.

34. That the hours of work of the office proper need not necessarily be changed.

35. That certain reductions be made in the superior establishment of the office.

36. That every attempt be made to fill the posts of Depot Manager and Assistant Factory Manager with as junior IMD officers as is compatible with efficiency.

37. That the present system of deputing accounts clerks to the depots from the office of Command Controllers be abolished and that accounts clerks be recruited directly like ordinary depot clerks.

38. That the accounts sections should not be supervised by an assistant senior to an Assistant Accountant.

39. That this Assistant Accountant be deputed from the office of the Command Controller and although responsible to the Controller in respect of general system of accounts should be amenable to the discipline of the Officer-in-charge while employed in the depot.

40. That the Officers-in-charge should, as at present, definitely remain responsible for the correctness of the depot accounts.

41. That the system of 100 per cent. audit employed in the audit sections be reduced to 60 per cent. and that, in consequence, certain retrenchments be effected in those sections.

42. That no attempt be made by Government deliberately to reduce the civil custom of the department.

43. That if any Provincial Government attempts to secede from the present system, it be pointed out that resumption of supplies might be impossible.

44. That to permit a better appreciation of the incidence of interest charges, stocks be divided into certain categories.

45. That the designation of Officer-in-charge be changed to Deputy Assistant Director General (Stores).

46. That the need for more careful selection of candidates for appointment to posts in the clerical establishment at depots be brought to the notice of Officers-in-charge.

47. That transfer be employed as a measure of disciplinary action.

48. That those stores which, although available locally, have to be imported by the firms who supply depots, be brought into the six months stock category.

APPENDIX II

Expansion in Stores Section of the office of the Director General, Indian Medical Service during World War II

1 *April*, 1939

D.G.I.M.S.
A.D.G.(ST.)

Ministerial Staff Designation	
Assistant-in-charge	1
Assistants	2
Clerks II Division	2
Total	5

Officers 2

31 *December*, 1939

D.G.I.M.S.
A.D.G.(ST.)

Ministerial Staff Designation	
Assistant-in-charge	1
Assistants	4
Clerks III Division	7
Total	12

Officers 2

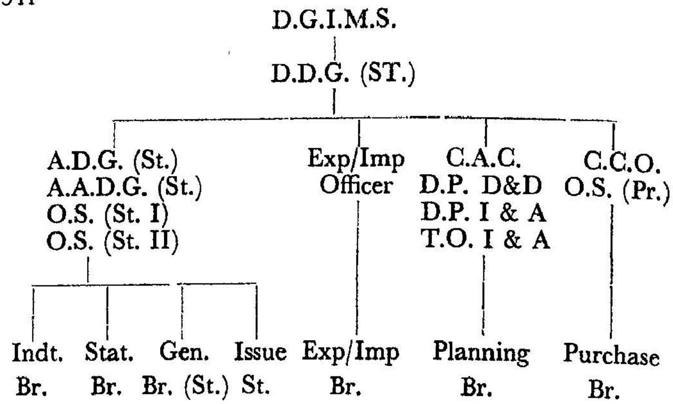
31 *December*, 1940

D.G.I.M.S.
A.D.G. (ST.)
Chief Advisory Chemist
Dir. Prod. Drugs & Dressings

Ministerial Staff Designation	
Superintendent	1
Assistants	8
Clerks III Division	9
Total	18

Officers 4

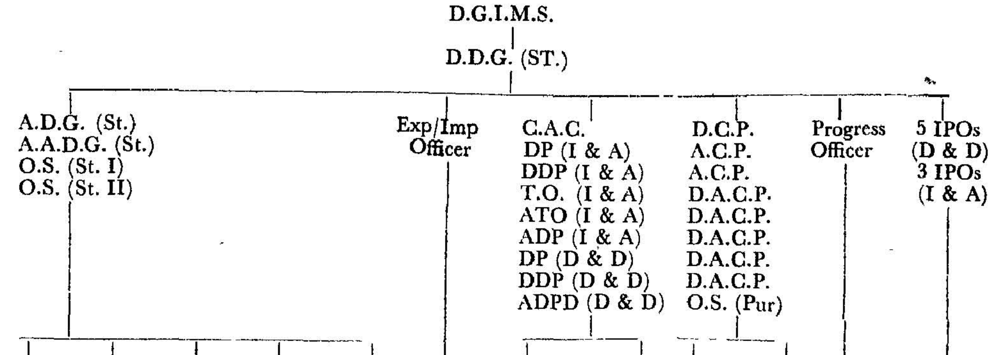
31 *December*, 1941



Ministerial Staff Designation	Indt. Br.	Stat. Br.	Gen. Br. (St.)	Issue St.	Exp/Imp Br.	Planning Br.	Purchase Br.
Superintendent	1		1				
Asstt.-in-charge		1			1	1	1
Assistants	4	2	4		2	3	6
Clerk III Division	2	4	3	11	3	2	11
Asstt. Chemist					1	1	
Total	7	7	8	11	7	7	18

Grand Total		
	Ministerial Staff	65
	Officers	13

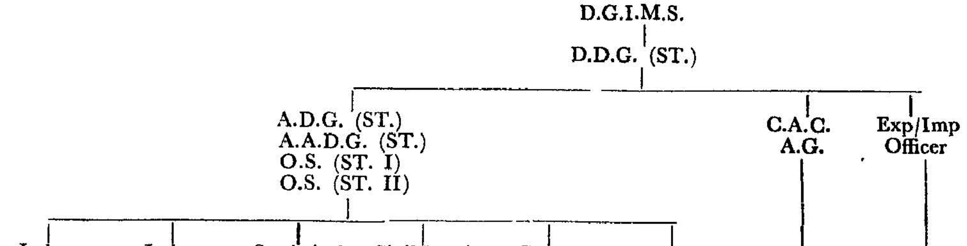
31 *December*, 1942



Ministerial Staff Designation		Indent Br. I & II	Stat. Br.	Civil Prov. Br.	Gen. Br. (St.)	Issue Br. (St.)	Exp/Imp Br.	Drugs TAB	Planning Br.	Purchase Branches	St. Br.	Progress Branches	Staff for IPOs
Superintendents	.. ..	1			1					2	1		
Asstt.-in-Charge	.. ..	1	1	1			1		3	9		1	
Assistants	.. ..	6	3	1	4		3	1	7	26	1		
Clerks II Div.	.. ..	2	2		2		2		1		3	4	
Clerks III Div.	.. ..	2	7	6	2	19	5	1	19	96	4	8	
Asstt. Chemists	.. ..	1					1	.	1		(Tech. Staff 22)		
Staff for IPOs	.. ..												7
Total	.. ..	13	13	8	9	19	12	2	31	133	31	13	7

Grand Total *Ministerial Staff* 270 *Officers* 34

31 *December*, 1943



Ministerial Staff Designation	Indent Branch I	Indent Branch II	Statistical Branch	Civil Provisioning Branch	General Branch	Issue Branch	Drugs T.A.B.	Exp/Imp Br.
Superintendents	1				1			
Assistant-in-Charge		1	1	1				1
Assistants	3	3	3	3	4		1	2
Clerk II Division	1	2	1	6	2			1
Clerk III Division	2	1	6	6	2	21		4
Assistant Chemist		1						1
Total	7	8	11	16	9	21	1	9

Grand Total *Ministerial Staff* 82 *Officers* 9

APPENDIX III

Report of a Committee under the Director General, Indian Medical Service to investigate the sources of supply of Drugs, Chemicals and Biological Products for the Medical Stores Department, the use of suitable substitutes and other measures of economy during the war. The Committee was held in the office of the Director General, Indian Medical Service during February and March, 1940

The Committee consisted of the following:—

President

Major General G. G. JOLLY, C.I.E., K.H.P., I.M.S., Director General, Indian Medical Service.

Members

Colonel D. H. RAI, M.C., V.H.S., I.M.S.

Lieutenant-Colonel H. HORAN-BROWN, I.M.S., Deputy Director, Medical Organization for War.

Lieutenant-Colonel M. K. KELAVKAR, M.B.E., I.M.S., Assistant Director General, (Stores), Indian Medical Service.

Mr. A. F. MACCULLOCH, M.B.E., Advisory Chemist, Medical Stores Department.

TERMS OF REFERENCE

The terms of reference of this Committee were as follows:—

1. To examine the list of imported and locally manufactured medical stores particularly drugs, chemicals and sera and to see to what extent the imported list could be reduced and the local list increased.
2. To examine and compare the list of essential drugs, etc., prepared by the office of the Director General, Indian Medical Service, with similar lists prepared in the United Kingdom by the Medical Research Council and in India by Colonel Chopra, Director, Biochemical Standardisation Laboratory, Calcutta.
3. To examine the question of substitutes when any article is not forthcoming.
4. To produce a list of composite drugs obtained locally (i.e., drugs requiring imported articles or raw materials for their manufacture).
5. To consider any other questions connected with economy in the use of drugs in Hospitals.

Item No. 1: " To examine the list of imported and locally manufactured medical stores particularly drugs, chemicals and sera and to see to what extent the imported list could be reduced and the local list increased."

In this connection the following remarks and recommendations are made:—

(a) The list of imported drugs obtained by the Director General, Indian Medical Service for the Medical Stores Department from the Director General, India Store Department, London and the list of stores locally purchased by the Medical Stores Department, were examined with a view to consider such drugs which might profitably be made in India, vide list attached (Annexure A). Colonel Chopra, Director, Biochemical Standardisation Laboratory, was consulted in this connection.

(b) Requirements shown against the items in Annexure A are the average annual requirements of Medical Store Depots in India during the past three years. It is probable that the actual requirements would be considerably increased during the war time.

(c) Mention may be made of the ways in which Britain and the U.S.A. helped to solve in 1914 the problem of the manufacture of drugs formerly purchased from Germany. The method adopted was to obtain data of the manufacture of drugs by experimental work carried out in the various University Laboratories. Novocain was done in one laboratory, Salvarsan in another and so on. Firms then worked on erecting pilot or small plants from these details. It would be difficult for various reasons to have this done in India. Laboratories would at once ask for a grant for this work.

(d) Another difficulty felt is that in many cases the amount required in India of any one drug is so uncertain and very often so small that manufacturers would be reluctant to put down expensive plant to make them on the doubtful chance of a sale. Chemical plant manufacturers would also be reluctant to consider quoting for a small plant.

(e) As regards manufacture in Medical Store Depot factories of drugs which might profitably be made in India, it was felt that in order not to compete with commercial firms only drugs which they have not been able to produce at a competitive price should be made by Medical Store Depot factories.

(f) As a possible solution it is recommended that large firms in India such as the Bengal Chemical and Pharmaceutical Works, Calcutta and the Alembic Chemical Co., Baroda might be asked if they could manufacture the Department's requirements of certain specified items which are at present imported and to state at what rates they could supply these items to the Department (vide suggested draft Annexure A-2). Annexure A consists of certain items which might profitably be made in India with comments on them. An agreement might be arrived at with the firm to buy our requirements from them over a period of, say, three years which might be extended, if necessary, in order to give the firm a reasonable opportunity of obtaining experience in the manufacture of any particular item and assurance of a market for its product.

(g) Certain vegetable drugs (raw products) are at present imported which it is considered might be grown in India. A list of three drugs with the average annual requirements of the Medical Stores Department is given at Annexure B. This list may be forwarded to the Imperial Council of Agricultural Research with a request to investigate the possibility of growing these drugs in India in the quantities required.

Item No. 2*:* " To examine and compare the list of essential drugs, etc., prepared by the office of the Director General, Indian Medical Service, with similar lists prepared in the United Kingdom by the Medical Research Council and in India by Colonel Chopra, Director, Biochemical Standardisation Laboratory, Calcutta."

(1) The list of Essential Drugs compiled in the Director General's office was compared with a list of Essential Drugs prepared by the Medical Research Council, London, and with a list received from Colonel Chopra which has been issued by the Government of Bengal. A new list of Essential Drugs, alphabetically arranged, was drawn up and this is attached as Annexure C.

(2) A list of Essential Chemicals, etc., including those required for clinical laboratory work was prepared and is attached as Annexure C-1.

(3) A list of Essential Sera and Vaccines was prepared and is attached as Annexure C-2.

Item No. 3*:* " To examine the question of substitutes when any article is not forthcoming."

(1) The list of Essential Drugs prepared (vide Terms of Reference 2 and given as Annexure C) was examined for substitutes and a further list showing possible substitutes is attached as Annexure D.

(2) In order to assist Government Medical Officers, Civil and Military, as far as possible, a list was drawn up of items in the Priced Vocabulary of Medical Stores which are also found in the list of Essential Drugs (*vide* Annexure C). Against those items alternatives are given wherever possible. Those items which are made in India from Indian raw materials and regarding which no difficulties are anticipated in the matter of supply are indicated by an asterisk. This list is attached as Annexure E. It must not be inferred that the alternatives given in Annexures D and E are always exact substitutes for the drugs against which they are noted. They are, however, considered capable of serving the purpose when the original drug is not available.

(3) A further list vide Annexure F, has been prepared comprising proprietary drugs of foreign origin which are commonly used in hospitals and indicating equivalents either of British or Indian manufacture. Such of the equivalents as occur in the Priced Vocabulary of Medical Stores are indicated by their PV numbers against them.

Item No. 4*:* " To produce a list of composite drugs obtained locally (i.e., drugs requiring imported articles or raw materials for their manufacture)."

The list of locally purchased drugs was examined to ascertain those of local manufacture which require imported raw materials for their manufacture. Such drugs on the MSD local purchase list which are important and required in large quantity were found to be few in number, as shown on the next page.

PV No.	Articles	Raw materials imported
22	Acidum Sulphuricum	Sulphur
31	Alumina Sulphate (Ferric)	Sulphur
59	Caffeinae Citras	Citric acid
195	Liquor Hydrogenii Peroxidi	Barium Peroxide
206	Magnesii Sulphas	Sulphur
293	Potassii Acetas	Caustic Potash, Acetic Acid
297	Potassii Citras	Caustic Potash, Citric Acid
300	Potassii Nitras	Caustic Potash
316	Quininae Salicylas	Salicylic Acid
336	Sodii Citras	Caustic Soda, Citric Acid
	Sapo Durus	Caustic Soda

A list showing the items which are made at the Medical Store Depots but require imported ingredients for their manufacture is attached as Annexure G.

Item No. 5: "To consider any other questions connected with economy in the use of drugs in Hospitals."

(1) A list of imported drugs which may be difficult to obtain in quantity and may rise in price is given as Annexure H.

It is suggested that this list be circulated to all hospitals, civil and military, with a recommendation that these drugs should be used as sparingly as possible and that less expensive substitutes more readily available should be used as far as possible. Administrative Medical Officers, however, are in the best position to exercise the necessary check.

(2) Economy in freight on medicines from Depots to Hospitals could be effected by hospitals preparing, in their own dispensaries, certain of the simpler preparations (vide report of the Departmental Committee in the Punjab on B. P. preparations, Annexure I). These items are easily prepared but there are certain possible dangers in having poisonous preparations such as Liquor Morphinae Hydrochloridi and Liquor Strychninae Hydrochloride prepared by compounders.

(3) The following is a list of items which could be made in hospitals with a considerable saving in freight. The actual saving is more than the amount stated as packing and freight on packing would also be saved.

Acidum Aceticum Glaciale for	
Acid Acetic	67%
Acidum phosphoricum for Acidum Phosphoricum Dilutum	88
Linimentum Terebinthinae	25
Liquor Arsenicalis	86
„ Arseniet Hydrargyri, Iodidi	98
„ Morphinae Hydrochloridi	72
„ Quininae Ammoniatatus	30
„ Strychninae Hydrochloridi	74

Tinctura Aloes	35%
,, Ferri Perchloridi	50
,, Hydrastis	30
,, Ipecacuanhae	50
,, Nucis Vomicae	40
,, Opii Camphorata	34
,, Senegae	26

(4) In the case of some tinctures, economy could be effected by their issue in a concentrated form. As has been pointed out in paragraph I of letter dated 16 December, 1939 from the Advisory Chemist (vide Annexure J) there are difficulties surrounding this policy. The danger of the theft of potable spirit is a very real one. Also if a more dilute alcohol is added to a concentrated tincture than that indicated in the B.P. all the active principles in the concentrated tincture would not go into solution and in certain cases this might lead to potent drugs being precipitated and, accumulating at the bottom of the bottle, given in the last doses issued. Distilled water is required to be added to the Spiritus Rectificatus to make up the alcohol necessary for dilution of the concentrated tincture to B.P. strength. There would be no saving in freight if this distilled water is also issued by the depots. The saving in freight can only be realised if this distilled water is made in hospitals.

(5) Depots would require to stock tinctures of B.P. concentration besides these concentrated tinctures. It would not be profitable for non-government institutions to obtain concentrated tinctures if the Spiritus Rectificatus required for dilution of the concentrated tinctures were surcharged with Excise Duty at a much higher rate than would be levied on alcohol in tinctures of ordinary B.P. strength. In the Madras Province, Excise Duty on Spiritus Rectificatus is Rs. 22–8 per proof gallon and on alcohol in tinctures of B.P. concentration Rs. 5–per proof gallon.

(6) The following is a list of tinctures which could be issued in a concentrated form. Concentrated tinctures of Benzoin Co., Cannabis Indicae and Chloroformi at Morphinae Co., requiring Spiritus Rectificatus for their dilution to B.P. strength are not included as no saving would obviously be realised in those cases.

PV No.		PV No.	
465	Aconiti	473	Camphorae Co
467	Arnicae Florum	475	Capsici
468	Asafoetidae	476	Cardamomi Co
469	Aurantii	477	Catechu
470	Belladonna	478	Chiratae
471-01	Buchu	480	Cinchona Co
472	Calumbae	481	Cinnamomi

TABLE—(*Contd.*)

PV No.		PV No.	
482	Colchici	498	Pruni Virginianae
485	Gelsemii	499	Quassiae
486	Gentianae Co	501	Rhei Co
487	Guaiaei Ammoniata	502	Scillae
488	Hyoscyami	504	Sennae Co
491	Kino	505	Stramonii
492	Lavandulae Co	506	Strophanthi
493	Lobeliae Aetherea	507	Valerianae Indicae Ammoniata
494	Myrrhae		
497	Podophylli Indici	508	Zingiberis

(7) In the case of the following tincture the corresponding extract may be used and the tincture deleted from the PVMS.

Extractum Opii Liquidum......................Tinctura Opii.

APPENDIX IV

Programme of Commitments—Medical Equipment

May 1941

**See Notes attached*

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 33	1	Field Ambulance	M.M.S. Lahore	New	Old Delhi
No. 34	2	Field Ambulance	M.M.S. Lahore	New	Secunderabad
No. 35	3	Field Ambulance	M.M.S. Lahore	New	Secunderabad
No. 36	4	Field Ambulance	M.M.S. Lahore	New	Secunderabad
No. 2	5	Field Hygiene Section	M.M.S. Peshawar	Conversion No. 2	Peshawar
			M.M.S. Rawalpindi	Conversion No. 3	Rawalpindi
No. 6	7	Field Hygiene Section	M.M.S. Lahore	New	
No. 9	8	Field Hygiene Section	M.M.S. Quetta	Conversion No. 9	
No. 20	9	Field Hygiene Section	M.M.S. Lahore	New	
No. 1	10	British Staging Section	M.M.S. Rawalpindi	Conversion No. 1	Rawalpindi
No. 7	11	British Staging Section	M.M.S. Lucknow	Conversion No. 7	
No. 9	12	British Staging Section	M.M.S. Quetta	Conversion No. 9	Quetta
No. 3	13	Indian Staging Section	M.M.S. Meerut	Conversion No. 3	Meerut
No. 4	14	Indian Staging Section	M.M.S. Rawalpindi	Conversion No. 4	Rawalpindi
No. 9	15	Indian Staging Section	M.M.S. Meerut	Conversion No. 9	Meerut
No. 13	16	Indian Staging Section	M.M.S. Quetta	Conversion No. 13	Quetta
No. 14	17	Indian Staging Section	M.M.S. Quetta	Conversion No. 14	Quetta
No. 61 C.G.H.	18*	General Hospital (H.Q.)	M.M.S. Meerut	New	Poona
No. 61 ,,	19*	General Hospital (Sections) Two	M.M.S. Poona	New	Poona
'O'	20*	General Hospital (Sections) One	M.M.S. Poona	New	Lahore
'P'	21*	General Hospital (Sections) One	M.M S. Poona	New	Lahore
'Q'	22*	General Hospital (Sections) One	M.M.S. Poona	New	Lahore
No. 4	23*	Field Laboratory	M.M.S. Quetta	New	Lahore
No. 10	24*	Field Laboratory	M.M.S. Peshawar	Conversion No. 1	Lahore
'Y' Det. Hospital	25*	River Sick Convoy (I.W.T.) (HQ. and 3 Sections)	M.M.S. Lahore	New	Poona
'E'	26*	Hospital Ship	M.M.S. Poona	New	

APPENDIX IV—(*Contd.*)

Notes for May, 1941

Note 1. *Serial No.* 18

Unit referred to in Serial No. 9, June 1941, in the Programme of commitments issued on 8th March, 1941.

Note. 2. *Serial Nos*. 19, 20, 21 *and* 22

Sections in Medical Mobilization Stores, Poona, surplus to Indian General Hospital, Kirkee, requirements will be used for this purpose.

Note 3. *Serial No*. 23

Field Laboratory recently transferred from Medical Store Depot, Bombay, to Medical Mobilization Stores, Quetta, will be used for this purpose.

Note 4. *Serial No*. 24

Unit referred to in Serial No. 18, January 42, in the Programme of Commitments issued on 8th March, 1941.

Note 5. *Serial No*. 25

Will be found from the equipment collected against Serial No. 16, September 41, in the Programme of Commitments issued on 8th March, 1941.

Note 6. *Serial No*. 26

Will be found from equipment recently transferred from Medical Store Depot, Bombay, to Medical Mobilization Stores, Poona.

**See Notes attached.*

June 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 1	1	Light Field Ambulance (Training)	M.M.S. Lucknow	New	Sialkot
No. 16	2*	Field Hygiene Section	M.M.S. Poona	New	Poona
No. 17	3	Field Hygiene Section	M.M.S. Lahore	New	Poona
No. 21	4	Field Hygiene Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 25	5*	Field Hygiene Section	M.M.S. Poona	New	Poona
No. 13	6*	British Staging Section	M.M.S. Meerut	New	Meerut
No. 7	7	Indian Staging Section	M.M.S. Lahore	New	Rawalpindi

APPENDIX IV—(*Contd.*)

June 1941—*Contd.*

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 8	8	Indian Staging Section	M.M.S. Lahore	New	Rawalpindi
No. 20	9*	Indian Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 27	10	Indian Staging Section	M.M.S. Lahore	New	Rawalpindi
No. 9	11	Casualty Clearing Station	M.M.S. Lahore	New	Lahore
No. 27 I.G.H.	12	General Hospital (H.Q.)	M.M.S. Lahore	New	Lucknow
No. 28 C.G.H.	13	General Hospital (H.Q.)	M.M.S. Lahore	New	Rawalpindi
No. 31 C.G.H.	14	General Hospital (H.Q.)	M.M.S. Lahore	New	Lucknow
No. 32 C.G.H.	15	General Hsopital (H.Q.)	M.M.S. Lahore	New	Poona
No. 33 C.G.H.	16	General Hospital (H.Q.)	M.M.S. Lahore	New	Quetta
No. 34 C.G.H.	17	General Hospital (H.Q.)	M.M.S. Lahore	New	Meerut
No. 27 I.G.H.	18	General Hospital (Sections) Five	M.M.S. Lahore	New	Lucknow
No. 28 C.G.H.	19	General Hospital (Sections) Six	M.M.S. Lahore	New	Rawalpindi
No. 31 C.G.H.	20	General Hospital (Sections) Six	M.M.S. Lahore	New	Lucknow
No. 32 C.G.H.	21	General Hospital (Sections) Six	M.M.S. Lahore	New	Poona
No. 33 C.G.H.	22	General Hospital (Sections) Six	M.M.S. Lahore	New	Quetta
No. 3	24*	British Convalescent Depot	M.M.S. Quetta	New	Quetta
No. 7	25*	Indian Convalescent Depot	M.M.S. Lucknow	New	Lucknow
No. 8	26	Field Laboratory	M.M.S. Rawalpindi	New	Rawalpindi
No. 10	27	Depot of Medical Stores	M.M.S. Quetta	New	Quetta
'C'	28	Hospital Ship	M.M.S. Poona	New	Poona
'D'	29	Hospital Ship	M.M.S. Poona	New	Poona
'F'	30*	Hospital Ship	M.M.S. Poona	New	

Notes for June, 1941

Note 1. *Serial No.* 2
Unit referred to in Serial No. 22, July 1941, in the Programme of Commitments issued on 8th March, 1941.

APPENDIX IV—(*Contd.*)

Note 2. *Serial No.* 5
Unit referred to in Serial No. 7, June 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 3. *Serial No.* 6
Unit referred to in Serial No. 6, May 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 4. *Serial No.* 9
Unit referred to in Serial No. 4, June 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 5. *Serial No.* 24
Unit referred to in Serial No. 15, May 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 6. *Serial No.* 25
Unit referred to in Serial No. 5, June 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 7. *Serial No.* 30
The Medical Equipment held at Medical Store Depot, Calcutta, for one Hospital Ship will be used to meet this commitment and will be transferred forthwith.

**See Notes attached*

July 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 23	1	Field Ambulance	M.M.S. Peshawar	New	Attock
No. 24	2	Field Ambulance	M.M.S. Rawalpindi	New	Wah Camp
No. 37	3	Field Ambulance	M.M.S. Rawalpindi	New	Campbellpore
No. 40	4	Field Ambulance	M.M.S. Rawalpindi	New	Rawalpindi
No. 19	5	Field Hygiene Section	M.M.S. Rawalpindi	New	Attock
No. 22	6	Field Hygiene Section	M.M.S. Poona	New	Ahmednagar/ Poona
No. 14	7*	British Staging Section	M.M.S. Meerut	New	Lucknow
No. 15	8	British Staging Section	M.M.S. Poona	New	
No. 16	9	British Staging Section	M.M.S. Poona	New	Poona
No. 17	10	British Staging Section	M.M.S. Lahore	New	Poona
No. 18	11	British Staging Section	M.M.S. Lahore	New	Poona

APPENDIX IV—(*Contd.*)

July 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 20	12*	British Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 21	13*	Indian Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 22	14	Indian Staging Section	M.M.S. Lahore	New	Rawalpindi
No. 23	15	Indian Staging Section	M.M.S. Lahore	New	Lucknow
No. 38	16	Indian Staging Section	M.M.S. Meerut	New	Meerut
No. 10	17	Casualty Clearing Station	M.M.S. Lahore	New	Quetta
No. 18 I.G.H.	18	General Hospital (H.Q.)	M.M.S. Meerut	New	Meerut
No. 19 I.G.H.	19	General Hospital (H.Q.)	M.M.S. Rawalpindi	New	Rawalpindi
No. 37 C.G.H.	20	General Hospital (H.Q.)	M.M.S. Lahore	New	Rawalpindi
No. 18 I.G.H.	21	General Hospital (Sections) Ten	M.M.S. Meerut	New	Meerut
No. 19 I.G.H.	22	General Hospital (Sections) Ten	M.M.S. Rawalpindi	New	Rawalpindi
No. 37 C.G.H.	23	General Hospital (Sections) Eight	M.M.S. Lahore	New	Rawalpindi
No. 4	24	British Convalescent Depot	M.M.S. Lahore	New	Rawalpindi
No. 4	25*	Indian Convalescent Depot	M.M.S. Meerut	New	Meerut
No. 23	26	Indian Convalescent Depot	M.M.S. Quetta	New	Quetta
No. 13	27	Field Laboratory	M.M.S. Rawalpindi	New	
No. 14	28	Field Laboratory	M.M.S. Rawalpindi	New	
No. 15	29	Field Laboratory	M.M.S. Poona	New	
No. 16	30	Field Laboratory	M.M.S. Poona	New	
No. 11	31	Depot of Medical Stores	M.M.S. Poona	New	Poona
'X'	32*	Ambulance Train	M.M.S. Lucknow	New	
'Y'	33*	Ambulance Train	M.M.S. Lucknow	New	
No. 1	34	Base Depot of Medical Stores	M.M.S. Poona	New	Poona
'Z' Det. Hospital	35*	River Sick Convoy (I.W.T.) (Sections) Three	M.M.S. Lahore	New	

APPENDIX IV—(*Contd.*)

Notes for July, 1941

Note 1. *Serial No.* 7
Unit referred to in Serial No. 3, July 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 2. *Serial No.* 12
Unit referred to in Serial No. 3, June 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 3. *Serial No.* 13
Unit referred to in Serial No. 6, July 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 4. *Serial No.* 25
Unit referred to in Serial No. 9, July 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 5. *Serial No.* 32
Unit referred to in Serial No. 12, September 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 6. *Serial No.* 33
Unit referred to in Serial No. 13, September 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 7. *Serial No.* 35
Will be found from equipment collected against Serial No. 16, September 1941, in the Programme of Commitments issued on 8th March, 1941.

**See Notes Attached*

August 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 4	1*	Light Field Ambulance	M.M.S. Lahore	New	
No. 24	2	Field Hygiene Section	M.M.S. Quetta	New	Quetta
No. 32	3	Field Hygiene Section	M.M.S. Lucknow	New	Lucknow/ Bareilly/ Jhansi
No. 1	4	Armoured Division Field Hygiene Section	M.M.S. Lahore	New	Sialkot

APPENDIX IV—(*Contd.*)

August 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 39	5	Indian Staging Section	M.M.S. Poona	New	Poona
No. 1	6	Casualty Clearing Station	M.M.S. Peshawar	Conversion No. 1	Peshawar
No. 8	7*	Casualty Clearing Station	M.M.S. Meerut	New	Meerut
No. 35 C.G.H.	8	General Hospital (H.Q.)	M.M.S. Lahore	New	Lucknow
No. 36 C.G.H.	9	General Hospital (H.Q.)	M.M.S. Poona	New	Poona
No. 35 C.G.H.	10	General Hospital (Sections) Six	M.M.S. Lahore	New	Lucknow
No. 36 C.G.H.	11	General Hospital (Sections) Six	M.M.S. Poona	New	Poona
No. 11	12	Field Laboratory	M.M.S. Lahore	Conversion No. 3	
No. 17	13	Field Laboratory	M.M.S. Poona	New	
No. 18	14	Field Laboratory	M.M.S. Poona	New	
No. 19	15	Field Laboratory	M.M.S. Poona	New	
No. 7	16	Anti-Malarial Unit	M.M.S. Rawalpindi	New	Rawalpindi
No. 9	17	Anti-Malarial Unit	M.M.S. Peshawar	New	Peshawar
No. 1	18	Depot of Medical Stores	M.M.S. Peshawar	Conversion No. 1	Peshawar
No. 2	19	Depot of Medical Stores	M.M.S. Rawalpindi	Conversion No. 2	Peshawar
No. 1	20	Ambulance Train	M.M.S. Lahore	Conversion No. 1	Lahore
No. 5	21	Ambulance Train	M.M.S. Meerut	Conversion No. 5	Meerut

Notes for August, 1941

Note 1. *Serial No.* 1
Previously designated No. 4 Armoured Brigade Field Ambulance.

Note 2. *Serial No.* 7
Unit referred to in Serial No. 4, November 1941, in the Programme of Commitments issued on 8th March, 1941.

APPENDIX IV—(*Contd.*)

September 1941

**See Notes attached*

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 22	1	Field Ambulance	M.M.S. Poona	New	Ahmednagar/ Poona
No. 38	2	Field Ambulance	M.M.S. Poona	New	„
No. 39	3	Field Ambulance	M.M.S. Poona	New	„
No. 41	4	Field Ambulance	M.M.S. Quetta	New	Quetta Area
No. 5	5*	Light Field Amublance	M.M.S. Lahore	New	
No. 6	6*	Light Field Ambulance	M.M.S. Lahore	New	
No. 2	7	Armoured Division Field Hygiene Section	M.M.S. Lahore	New	
No. 2	8	British Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 3	9	British Staging Section	M.M.S. Quetta	New	Chaman
No. 16	10	Indian Staging Section	M.M.S. Quetta	New	Chaman
No. 28	11	Indian Staging Section	M.M.S. Quetta	New	Chaman
No. 30	12	Indian Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 31	13	Indian Staging Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 6	14	Casualty Clearing Station	M.M.S. Quetta	Conversion No. 6	Quetta
No. 15	15	Casualty Clearing Station	M.M.S. Quetta	New	Quetta
No. 54 C.G.H.	16*	General Hospital (H.Q.)	M.M.S. Meerut	New	
No. 55 C.G.H.	17*	General Hospital (H.Q.)	M.M.S. Meerut	New	
No. 56 C.G.H.	18*	General Hospital (H.Q.)	M.M.S. Meerut	New	
No. 59 I.G.H.	19*	General Hospital (H.Q.)	M.M.S. Meerut	New	
No. 58 I.G.H.	20	General Hospital (H.Q.)	M.M.S. Lucknow	New	
No. 54 C.G.H.	21*	General Hospital (Sections) Six	M.M.S. Meerut	New	
No. 55 C.G.H.	22*	General Hospital (Sections) Six	M.M.S. Meerut	New	
No. 56 C.G.H.	23*	General Hospital (Sections) Six	M.M.S. Meerut	New	
No. 58 I.G.H.	24*	General Hospital (Sections) Four	M.M.S. Lucknow		

APPENDIX IV—(*Contd.*)

September 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 59 I.G.H.	25*	General Hospital (Sections) Ten	M.M.S. Meerut	New	
	26*	General Hospital (Sections) Thirty-two	M.M.S. Rawalpindi	New	
	27*	General Hospital (Sections) One	M.M.S. Lucknow	New	(Unallotted)
No. 1	28	British Convalescent Depot	M.M.S. Rawalpindi	Conversion No. 1	Rawalpindi
No. 7	29	British Convalescent Depot	M.M.S. Rawalpindi	New	Rawalpindi
No. 5	30	Indian Convalescent Depot	M.M.S. Rawalpindi	New	Rawalpindi
No. 8	31	Indian Convalescent Depot	M.M.S. Lahore	New	
No. 11	32	Indian Convalescent Depot	M.M.S. Rawalpindi	New	Rawalpindi
No. 1	33	Field Laboratory	M.M.S. Peshawar	New	
No. 3	34	Field Laboratory	M.M.S. Rawalpindi	New	Quetta
No. 9	35	Field Laboratory	M.M.S. Poona	New	Peshawar
No. 12	36	Field Laboratory	M.M.S. Rawalpindi	New	
No. 13	37	Depot of Medical Stores	M.M.S. Quetta	New	Quetta
No. 4	38	Ambulance Train	M.M.S. Lahore	Conversion No. 4	Lahore
No. 6	39	Ambulance Train	M.M.S. Meerut	Conversion No. 6	Meerut
	40*	River Sick Convoy (I.W.T.) (Sections) Four	M.M.S. Lahore	New	(Unallotted)

Notes for September, 1941

Note 1. *Serial No.* 5
Previously designated No. 5 Armoured Brigade Field Ambulance.

Note 2. *Serial No.* 6
Previously designated No. 6 Armoured Brigade Field Ambulance.

Note 3. *Serial Nos.* 16, 17, 18 and 19
Units referred to in Serial Nos. 11, 12, 13 and 14, August 1941, in the Programme of Commitments issued on 8th March, 1941.

APPENDIX IV—(*Contd.*)

Note 4. *Serial Nos.* 21, 22 *and* 23.
Equipment will be found from that shown against Serial No. 15, August 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 5. *Serial No.* 24
Equipment will be found from that collected against Serial No. 10, April 1942, in the Programme of Commitments issued on 8th March, 1941. Of the balance, one section will be transferred to Medical Mobilization Stores, Meerut, forthwith to meet part of Serial No. 25, September 1941 (vide Note 6 below).

Note 6. *Serial No.* 25
Equipment will be found from that collected against Serial No. 10, June 1941, 15, August 1941, and 10, April 1942, in the Programme of Commitments issued on 8th March, 1941 (vide Note 5 above).

Note 7. *Serial No.* 26
Unit referred to in Serial Nos. 5 and 6, April 1941, in the Programme of Commitments issued on 8th March, 1941.

Note 8. *Serial No.* 27
Balance of equipment ordered against Serial No. 10, April 1942, in the Programme of Commitments issued on 8th March, 1941.

Note 9. *Serial No.* 40
Balance of equipment ordered against Serial No. 16, September 1941, in the Programme of Commitments issued on 8th March, 1941.

**See Notes attached*

October 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 42	1	Field Ambulance	M.M.S. Quetta	New	Quetta Area
No. 43	2	Field Ambulance	M.M.S. Lahore	New	Quetta Area
No. 47	3	Field Ambulance	M.M.S. Lucknow	Conversion 'R' Fd. Amb	Bareilly
No. 48	4	Field Ambulance	M.M.S. Lucknow	New	Lucknow
No. 7	5*	Light Field Ambulance	M.M.S. Lahore	New	

APPENDIX IV—(*Contd.*)

October 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 26	6	Field Hygiene Section	M.M.S. Quetta	New	Quetta
No. 28	7	Field Hygiene Section	M.M.S. Quetta	New	Quetta
No. 29	8	Field Hygiene Section	M.M.S. Poona	New	Secunderabad Area
No. 5	9	British Staging Section	M.M.S. Peshawar	New	Peshawar
No. 6	10	British Staging Section	M.M.S. Peshawar	New	Peshawar
No. 32	11	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 33	12	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 34	13	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 35	14	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 13	15	Casualty Clearing Station	M.M.S. Lucknow	New	Lucknow
No. 14	16	Casualty Clearing Station	M.M.S. Rawalpindi	New	Rawalpindi
No. 38C.G.H.	17	General Hospital (H.Q.)	M.M.S. Rawalpindi	New	Rawalpindi
No. 39C.G.H.	18	General Hospital (H.Q.)	M.M.S. Rawalpindi	New	Rawalpindi
No. 40C.G.H.	19	General Hospital (H.Q.)	M.M.S. Rawalpindi	New	Rawalpindi
No. 41 I.G.H.	20	General Hospital (H.Q.)	M.M.S. Lahore	New	Lahore
No. 57C.G.H.	21	General Hospital (H.Q.)	M.M.S. Rawalpindi	New	Rawalpindi
No. 38C.G.H.	22	General Hospital (Sections) Six	M.M.S. Rawalpindi	New	Rawalpindi
No. 39C.G.H.	23	General Hospital (Sections) Six	M.M.S. Rawalpindi	New	Rawalpindi
No. 40C.G.H.	24	General Hospital (Sections) Six	M.M.S. Rawalpindi	New	Rawalpindi
No. 41 I.G.H.	25	General Hospital (Sections) Ten	M.M.S. Lahore	New	Lahore
No. 57C.G.H.	26	General Hospital (Sections) Six	M.M.S. Rawalpindi	New	Lahore
	27*	General Hospital (Sections) Nineteen	M.M.S. Lahore	New	(Unallotted)
No. 5	28	British Convalescent Depot	M.M.S. Quetta	New	Quetta
No. 9	29	Indian Convalescent Depot	M.M.S. Lahore	New	Quetta

APPENDIX IV—(*Contd.*)

October 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 8	30	Anti-Malarial Unit	M.M.S. Quetta	New	Quetta
No. 10	31	Anti-Malarial Unit	M.M.S. Quetta	New	Quetta
No. 5	32	Depot of Medical Stores	M.M.S. Quetta	Conversion No. 5	Quetta
No. 12	33	Depot of Medical Stores	M.M.S. Rawalpindi	New	Rawalpindi
No. 7	34	Ambulance Train	M.M.S. Meerut	Conversion No. 7	Meerut

Notes for October, 1941

Note 1. *Serial No.* 5
Previously designated No. 7 Armoured Brigade Field Ambulance.

Note 2. *Serial No.* 27
Unit referred to in serial No. 17, January 1942, in the Programme of Commitments issued on 8th March, 1941.

November 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 49	1	Field Ambulance	M.M.S. Lucknow	New	Jhansi
No. 50	2	Field Ambulance	M.M.S. Poona	New	Secunderabad
No. 51	3	Field Ambulance	M.M.S. Poona	New	Secunderabad
No. 52	4	Field Ambulance	M.M.S. Poona	New	Secunderabad
No. 23	5	Field Hygiene Section	M.M.S. Quetta	New	Chaman
No. 30	6	Field Hygiene Section	M.M.S. Meerut	New	Delhi/Meerut
No. 31	7	Field Hygiene Section	M.M.S. Rawalpindi	New	Rawalpindi
No. 10	8	British Staging Section	M.M.S. Peshawar	New	Peshawar

APPENDIX IV—(*Contd.*)

November 1941—(*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 29	9	Indian Staging Section	M.M.S. Meerut	New	Meerut
No. 36	10	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 37	11	Indian Staging Section	M.M.S. Peshawar	New	Peshawar
No. 11	12	Casualty Clearing Station	M.M.S. Rawalpindi	New	Rawalpindi
No. 16	13	Casualty Clearing Station	M.M.S. Quetta	New	Quetta
No. 42 I.G.H.	14	General Hospital (H.Q.)	M.M.S. Quetta	New	Quetta
No. 46C.G.H.	15	General Hospital (H.Q.)	M.M.S. Lahore	New	Lahore
No. 47C.G.H.	16	General Hospital (H.Q.)	M.M.S. Lahore	New	Lahore
No. 48C.G.H.	17	General Hospital (H.Q.)	M.M.S. Meerut	New	Meerut
No. 49C.G.H.	18	General Hospital (H.Q.)	M.M.S. Lahore	New	Lahore
No. 42 I.G.H.	19	General Hospital (Sections) Ten	M.M.S. Quetta	New	Quetta
No. 46C.G.H.	20	General Hospital (Sections) Six	M.M.S. Lahore	New	Lahore
No. 47C.G.H.	21	General Hospital (Sections) Six	M.M.S. Lahore	New	Lahore
No. 48C.G.H.	22	General Hospital (Sections) Six	M.M.S. Meerut	New	Meerut
No. 49C.G.H.	23	General Hospital (Sections) Six	M.M.S. Lahore	New	Lahore
No. 9	24	Depot of Medical Stores	M.M.S. Lahore	New	Lahore

December 1941

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 44	1	Field Ambulance	M.M.S. Rawalpindi	New	Rawalpindi
No. 53	2	Field Ambulance	M.M.S. Meerut	New	Delhi/Meerut
No. 54	3	Field Ambulance	M.M.S. Meerut	New	Delhi/Meerut
No. 55	4	Field Ambulance	M.M.S. Meerut	New	Delhi/Meerut
No. 27	5	Field Hygiene Section	M.M.S. Lucknow	Conversion ‘ J ’ Fd. Hyg. Sect.	Peshawar
No. 33	6	Field Hygiene Section	M.M.S. Poona	Conversion ‘ L ’ Fd. Hyg. Sect.	Peshawar

APPENDIX IV—(*Contd.*)

December 1941— (*Contd.*)

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 12	7	Casualty Clearing Station	M.M.S. Lahore	Conversion 'A' C.C.S.	Rawalpindi
No. 17	8	Casualty Clearing Station	M.M.S. Meerut	New	Muttra
No. 43 I.G.H.	9	General Hospital (H.Q.)	M.M.S. Meerut	New	Meerut
No. 50C.G.H.	10	General Hospital (H.Q.)	M.M.S. Lahore	New	Lahore
No. 51C.G.H.	11	General Hospital (H.Q.)	M.M.S. Quetta	New	Quetta
No. 52C.G.H.	12	General Hospital (H.Q.)	M.M.S. Meerut	New	Meerut
No. 53C.G.H.	13	General Hospital (H.Q.)	M.M.S. Lucknow	New	Lucknow
No. 43 I.G.H.	14	General Hospital (Sections) Ten	M.M.S. Meerut	New	Meerut
No. 50C.G.H.	15	General Hospital (Sections) Six	M.M.S. Lahore	New	Lahore
No. 51C.G.H.	16	General Hospital (Sections) Six	M.M.S. Quetta	New	Quetta
No. 52C.G.H.	17	General Hospital (Sections) Six	M.M.S. Meerut	New	Meerut
No. 53C.G.H.	18	General Hospital (Sections) Seven	M.M.S. Lucknow	New	Lucknow
No. 3	19	Depot of Medical Stores	M.M.S. Lahore	Conversion No. 3	Lahore
No. 14	20	Depot of Medical Stores	M.M.S. Quetta	New	Quetta

January 1942

Final Designation	Serial No.	Requirements	Required from	Source	Disposal
No. 45	1	Field Ambulance	M.M.S. Quetta	New	Loralai
No. 46	2	Field Ambulance	M.M.S. Peshawar	New	Peshawar
No. 56	3	Field Ambulance	M.M.S. Quetta	New	Quetta
No. 44 I.G.H.	4	Central Hospital (H.Q.)	M.M.S. Lucknow	New	Lucknow
No. 45 I.G.H.	5	Central Hospital (H.Q.)	M.M.S. Quetta	New	Quetta
No. 44 I.G.H.	6	General Hospital (Sections) Ten	M.M.S. Lucknow	New	Lucknow
No. 45 I.G.H.	7	General Hospital (Sections) Ten	M.M.S. Quetta	New	Quetta
	8	General Hospital (Sections) Four	M.M.S. Lahore	New	(Unallotted)
No. 15	9	Depot of Medical Stores	M.M.S. Peshawar	New	Peshawar

APPENDIX V(a)

‘U’ List 1941 (Revised)

(SHOWING REQUIREMENTS OF ONE DIVISION FOR ONE MONTH)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
		(1) *Drugs*		
1.	5*	Acidum Aceticum Glaciale	Lb.	2
2.	6	,, Acetyl-Salicylicum	,,	60
3.	8	,, Benzoicum	,,	2
4.	9	,, Boricum	,,	70
5.	10	,, Carbolicum	,,	32
6.	12	,, Citricum	,,	60
7.	15*	,, Hydrochloricum	,,	8
8.	17*	,, Hydrocyanicum dilutum	,,	2
9.	18*	,, Nitricum	,,	15
10.	20*	,, Picricum	,,	1½
11.	21	,, Salicylicum	,,	3
12.	22	,, Sulphuricum	,,	35
13.	23*	,, ,, Aromaticum	,,	30
14.	25*	,, Tannicum	,,	10
15.	25–01	,, Trichloroaceticum	Ozs.	8
16.	26	,, Tartaricum	Lb.	15
17.	26–01	Acriflavine	,,	1½
18.	27*	Adeps Lanae	,,	30
19.	28	Aether Purificatus for anaesthetic purposes	,,	160
20.	30*	Alumen	,,	40
21.	31*	Aluminium Sulphate (Ferric)	Tons	1½
22.	34	Ammonii Carbonas	Lb.	60
23.	35*	,, Chloridum	,,	15
24.	36–02	Ampoules collosol, gum saline transfusion Crooke’s pattern 560 cc.	Amps.	50
25.	36–03	Ampoules collosol, normal glucose 5 per cent transfusion Crooke’s pattern 560 cc.	,,	30
26.	37	Amylis Nitris, Capsules of 5 minims.	Boxes	4
27.	38	Amylocaine Hydrochloride, 5 gramme bottles	Bottles	20
28.	39*	Amylum (Maize Starch)	Lb.	30
29.	N.I.V.*	Aqua Destillata 5 cc ampoules	Amps.	600
30.	N.I.V.*	,, ,, 1 cc ,,	,,	750
31.	42*	Argenti Nitras (Crystals)	Lb.	1
32.	43*	,, ,, Induratus	Ozs.	6
33.	N.I.V.	Atebrin Musonate (Mepacrine methane sulphonate)	Amps.	180
34.	46	Atropinae Sulphas	Drs.	4
35.	50–02	Bismostab, in 10 cc	Amps.	100

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
36.	51	Bismuthi Carbonas	Lb.	60
37.	54	Bleaching powder (Stabilized) (in 4 oz. tins)	Cwts.	15
38.	59*	Caffeinae Citras	Lb.	12
39.	60*	Calamina Praeparata	„	25
40.	63*	Calcii Lactas	„	15
41.	66–01*	Camphor in oil, ampoules of 1 cc containing 3 grs. camphor	Amps.	800
42.	68*	Camphorodyne	Lb.	50
43.	70–01*	Carbonii Tetrachloridum	„	8
44.	71–01*	Cataplasma Kaolini	„	270
45.	75*	Chloral Hydras	„	4
46.	77*	Chloroformum, in 1 oz. tubes	„	26
47.	78	„ in 1 lb. bottles	„	90
48.	78–01*	Chlorosol	„	75
49.	79	Chrysarobinum	„	2½
50.	81–01*	Clarifying Powder	Tons	2¼
51.	82	Cocainae Hydrochloridum	Ozs.	4
52.	84*	Collodium Flexile	Lb.	3½
53.	89–01	Coramine, or Anacardone (B.D.H.) or other British Product	Amps.	1500
54.	90*	Cream Anti-Mosquito	Lb.	2100
55.	91	Creosotum	„	2½
56.	92	Cresol, saponified	„	1800
57.	95*	Cupri Sulphas	„	2
58.	98–01*	Dionin (Ethyl Morphinae Hydrochloride)	Drs.	4
59.	101*	Emplastrum Belladonnae	Lb.	20
60.	109	Eserina (Physostigmine) Salicylas, B.P. 1932	Dr.	2
61.	110	Ethocaine (Novocaine) Procainae Hydrochloridum	Ozs.	12
62.	111–01*	Ethyl Chloride, tubes of 50 cc. with spray attachment	Tubes	60
63.	116	Extractum Cascara Sagrada Liquidum	Lb.	60
64.	122	Extractum Filicis	„	3
65.	141*	Ferri Sulphas Exsiccatus	„	18
66.	145*	Fly Spray	„	18
67.	148	Glucosum Liquidum	„	150
68.	149*	Glycerinum	„	180
69.	151–01*	Gummi Indicum	„	15
70.	N.I.V.	Guttae Florescinae B.P.C.	Ozs.	4
71.	152	Hexamina (Urotropine)	Lb.	15
72.	153	Homatropinae Hydrobromidum	Drs.	4
73.	159	Hydrargyri Oxidi Flavum	Ozs.	1
74.	161	„ Perchloridum	„	4
75.	163	„ Subchloridum	Lb.	15

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
76.	N.I.V.	Hyoscinae Hydrobromidum	Drs.	2
77.	N.I.V.*	Individual water sterilizing outfit chlorinating tablets for	Tabs	15000
78.	N.I.V.*	Individual water sterilizing outfit dechlorinating tablets for	,,	15000
79.	N.I.V.*	Injection morphinae 1 cc. Amps	Amps.	3000
80.	170	Iodoformum	Lb.	4
81.	171	Iodum	Ozs.	12
82.	173*	Kaolinum	Lb.	8
83.	174–01*	Lassar's Paste	,,	8
84.	176*	Linimentum Belladonnae	,,	30
85.	180*	,, Saponis	,,	120
86.	184*	Liquor Adrenalinae Hydrochloridi, bottles of 1 oz.	Bottles	100
87.	186*	Liquor Ammoniae Fortis	Lb.	2½
88.	188*	,, Arsenicalis (Neutral)	,,	15
89.	193*	,, Ferri Perchloridi Fortis	,,	10
90.	194	,, Formaldehyde	,,	30
91.	195	,, Hydrogenii Peroxidi	,,	250
92.	197*	,, Picis Carbonis	,,	7
93.	198*	,, Plumbi Subacetatis Fortis	,,	15
94.	N.I.V.*	Lysol, 91 per cent., in 2 oz. tubes	Tubes	70
95.	205–01*	Magnesii Carbonas Ponderosus	Lb.	60
96.	206*	Magnesii Sulphas	,,	700
97.	210	Menthol	,,	2
98.	N.I.V.	Maxochlor (in 4 oz. tins)	Cwt.	7½
99.	N.I.V.*	Mistura Inhalent	Lb.	30
100.	225	Neoarsphenamina, dose, of 15 G.	Tubes	360
101.	230*	Oleum Arachis	Lb.	200
102.	239*	Oleum Eucalypti	,,	2½
103.	242	,, Menthae Piperitae	,,	2½
104.	243*	,, Morrhuae	,,	70
105.	246*	,, Ricini	,,	150
106.	249*	,, Terebinthinae	,,	40
107.	254*	Oxymel Scillae	,,	15
108.	254–01	Paraaminobenzenesulphonamide Compounds:—		
		Sulphonamide ' P ' Tablets	Tabs.	75000
		M & B 693 Tablets	,,	60000
109.	256	Paraffinum Liquidum	Lb.	120
110.	257*	,, Molle Flavum	,,	250
111.	N.I.V.*	,, Molle, in tubes of 1½ ozs. each	Tubes	150
112.	260	Paraldehydum	Lb.	15
113.	N.I.V.	Pentothol Sodium	Amps.	500
114.	262–01	Percain solution, 1 in 1500, in 0·5 per cent. saline ampoules of 20 cc	,,	160
115.	263	Phenacetinum	Lb.	60

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
116.	269*	Pills Vegetable Laxative	Pills	12000
117.	280*	,, Plumbi cum Opio, 4 grains	,,	6000
118.	286*	Pituitary Extract (Posterior Lobe), ampoules ½ cc	Amps.	1000
119.	293*	Potassii Acetas	Lb.	15
120.	295	,, Bromidum	,,	15
121.	296	,, Chloras	,,	15
122.	297	,, Citras	,,	60
123.	299	,, Iodidum	,,	30
124.	300*	,, Nitras	,,	15
125.	301*	,, Permanganas	,,	40
126.	307*	Pulvis Jalapae Compositus	,,	7
127.	310–01*	Pyrethrum fly spray	Gallons	1750
128.	315–01*	Quininae Dihydrochloridum (6 grs. in 10 cc ampoules)	Amps.	1000
129.	315–02*	Quininae Dihydrochloridum (6 grs. 1 cc ampoules)	,,	300
130.	317*	Quininae Sulphas	Lb.	60
131.	319*	Resorcinol	,,	2
132.	324*	Santoninum	Drs.	3
133.	331	Sodii Bicarbonas	Lb.	250
134.	333	,, Carbonas	,,	4
135.	334	,, Carbonas Exsiccatus	,,	90
136.	335*	,, Chloridum	,,	100
137.	336	,, Citras	,,	30
138.	343	,, Phosphas Acidas	,,	30
139.	344	,, Salicylas	,,	90
140.	345*	,, Sulphas Exsiccatus	,,	90
141.	346	Sodium Arsenite (coloured)	,,	18
142.	N.I.V.	,, Thiosulphate (Crystalline)	,,	480
143.	349*	Spiritus Ammoniae Aromaticus	,,	100
144.	350*	,, Methylatus	,,	500
145.	351*	,, Rectificatus	,,	70
146.	352–03	Sulpharsphenamina, doses of 0·30 gm.	Tubes	250
147.	352–04	,, ,, of 0·45 gm.	,,	750
148.	352–05	,, ,, 0·60 gm.	,,	600
149.	356	Sulphur Sublimatum	Lb.	7½
150.	361*	Syrupus Ferri Phosphatus cum Quininae et Strychninae (Easton's Syrup)	,,	65
151.	363*	Syrupus Tolutanus	,,	60
152.	N.I.V.	Tablets Acriflavinae 1½ grs.	Tabs.	7500
153.	366	,, Hydrargyri Perchloridum 8¾ grs.	,,	2500
154.	368	Tablets Sodii Carbonas Exsiccatus, 22 grs.	,,	400
155.	369	Tablets Adrenalin, ·0003 gm.	,,	700

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
156.	371*	Tablets Apomorphinae Hydrochloride 1/10 gr.	Tabs.	200
157.	373	Tablets Atropinae Sulphas 1/150 grs. and Morphinae sulphas 1/4 grs.	„	600
158.	375	Tablets Atropinae Sulphas 1/100 grs.	„	200
159.	N.I.V.	„ Bismuthi Carbonas 10 grs.	„	4000
160.	N.I.V.	„ Bismuth et Soda	„	2000
161.	379	„ Cocainae Hydrochloridum 1/4 grs.	„	400
162.	380	„ Digitalin, 1/100 grs.	„	1000
163.	381	„ Emetinae Hydrochloridi ½ grs.	„	6000
164.	387*	„ Morphinae Sulphas, ½ gr.	„	7000
165.	388*	„ „ „ ¼ gr.	„	10000
166.	393	„ Physostigminae Salicylas 1/100 gr.	„	200
167.	402	„ Strychninae Hydrochloridum 1/60 gr.	„	3000
168.	409–01*	„ Intravenous, Saline Compound 36¾ grs. bottles of 100 tablets	„	4000
169.	411*	„ Sodii Chloridi	„	400
170.	412	„ Acidum Acetyl Salicylic 5 grs.	„	10000
171.	N.I.V.	„ Acetyl Salicylic grs. 3, Phenacetin grs. 2 et Opii grs. ½	„	3500
172.	414	„ Ammonii Carbonas 5 grs.	„	5000
173.	414–01	„ Argyrol (Argenti Proteinas mite) 7·7 grs.	„	1000
174.	415	„ Atebrin, 0·1 gm. (Mepacrine Hydrochloridum)	„	6000
175.	420	„ Hydrargyri Subchloridum 1 gr.	„	4000
176.	421–01	„ Soluble Barbitome	„	600
177.	423	„ Phenacetinum 4 grs. et Caffeina Citras, 1 gr.	„	8000
178.	423–01	„ Plasmoquine 0·01 gr. (Pamaquin)	„	1200
179.	423–02	„ Plasmoquine 0·02 gr. (Pamaquin)	„	1200
180.	425	„ Potassii Bromidum 10 grs.	„	4000
181.	426	„ „ Chloras 5 grs.	„	10000
182.	427	„ „ Iodidum 5 grs.	„	4000
183.	429	„ Pulvis Cretae Aromaticus Cum Opio 5 grs.	„	1000
184.	N.I.V.*	„ Pulvis Digitalis 1 gr.	„	2500
185.	433*	„ Quininae Dihydrochloridi 5 grs.	„	15000
186.	436	„ Sodii Bicarbonas 5 grs.	„	10000

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
187.	437	Tablets Sodii Salicylas 5 grs.	Tabs.	10000
188.	443*	,, Magnesii Sulphas 60 grs.	,,	2000
189.	460	,, Homatropinae Hydrochloridum 1/240 gr. et Cocainae Hydrochloridum 1/20 gr.	,,	1000
190.	461*	Talc. purified	Lb.	35
191.	461–01*	Tannafax in 4 oz. tubes	Tubes	200
192.	464*	Thymol	Lb.	2
193.	470*	Tinctura Belladonnae	,,	15
194.	471	,, Benzoini Compositus	,,	80
195.	473*	,, Camphorae Composita (Opii Camphorata)	,,	60
196.	486*	,, Gentianae Composita	,,	60
197.	488*	,, Hyoscyami	,,	30
198.	489	,, Iodi Fortis	,,	15
199.	490	,, Iodi Mitis	,,	400
200.	495*	,, Nucis Vomicae	,,	30
201.	496*	,, Opii	,,	3
202.	502*	,, Scillae	,,	30
203.	503*	,, Senegae	,,	60
204.	505*	,, Stramonii	,,	7
205.	508*	,, Zingiberis Mitis	,,	60
206.	511	Unguentum Acidi Borici	,,	60
207.	N.I.V.*	,, Atropinae 1 per cent	Ozs.	4
208.	513	,, Gallae Cum Opio	Lb.	7
209.	515	,, Hydrargyri Ammoniata	,,	30
210.	N.I.V.	,, ,, ,, in tubes of 1½ ozs. each	Tubes	100
211.	N.I.V.	,, Hydrargyri Oxidi	Ozs.	4
212.	520	,, Picis Liquidi	Lb.	15
213.	523	,, Sulphuris	,,	30
214.	524*	,, Zinci	,,	80
215.	531*	Zinci Oxidum	,,	80
216.	532*	,, Sulphas	,,	3
		(2) *Instruments and Appliances*		
217.	1418	Clips, suture, Michel's	Nos.	5000
218.	1282–03*	Gas, Carbon Dioxide, 20 c. ft. Cylinders	,,	20
219.	1347–02*	Gas, Nitrogen Monoxide, 100 gallon Cylinders	,,	40
220.	1354* 1356–01*	Gas, Oxygen, 20 c. ft. Cylinders	,,	120
221.	1445–01	Gloves, operation smooth, medium, sizes 6½, 7½, 8, 8½ (Ratio 2:4:5:3:1)	Pairs	72
222.	1445–02	Gloves, operation, smooth, thick, sizes 6½, 7, 7½, 8, 8½ (Ratio 2:4: 6:2:1)	,,	72

APPENDIX V(a)—(*Contd*).

Serial No.	PV Item No.	Name of Item	Unit	Quantity
223.	1445–03	Gloves, operation, rough, medium, sizes 6½, 7, 7½, 8, 8½ (Ratio 8:10:10:3:1)	Pairs	160
224.	1446	Gloves, Post mortem, sizes 8 and 9	,,	8
225.	1481*	Lamps, Electric, batteries for	Nos.	130
226.	957	Needles Hagedorn's 6 half curved and 12 straight in vulcanite case	Cases	5
227.	961	Needles Hagedorn's straight in case	,,	10
228.	967	,, Suture Intestinal	Pkts.	5
229.	N.I.V.	,, Suture ophthalmic ½ curved triangular, small and medium (Weiss B 584)	,,	8
230.	969	,, Intestinal, fully curved	,,	10
231.	970–01	,, Intestinal half curved	,,	10
232.	984	,, cutting, straight, size 1	,,	6
233.	984–01	,, Suture triangular, pointed straight, size medium No. 8 in packets of 6	,,	6
234.	984–02	,, Suture triangular, pointed ½ circle, size 3 in packets of 6	,,	6
235.	984–03	,, Suture triangular, pointed ½ circle, size 10, packets of 6	,,	6
236.	1628	Syringes exploring, all glass, platinum iridium needles for	Nos.	10
237.	1633	Syringes hypodermic, all metal, 20 minims. P.I. needles for	,,	100
238.	1939–13	Syringes record, 10 cc rustless steel needles for	,,	200
		(3) *Dressings, Ligatures and Tubing*		
239.	1715–01	Bandages, elastic, adhesive 2½″	,,	260
240.	1715–02	,, ,, ,, 3″	,,	300
241.	1715–03	,, ,, ,, 4″	,,	100
242.	N.I.V.	,, ,, ,, plain 6″ wide on spools, in metal containers	Tins	150
243.	1717*	Bandages flannel, 6″ × 7 Yds.	Nos.	700
244.	N.I.V.*	,, ,, 4″ × 6 Yds.	,,	1000
245.	1720*	,, loosewove, uncompressed	,,	7000
246.	1721*	,, ,, compressed	,,	7000
247.	N.I.V.*	,, ,, uncompressed 1″ × 6 Yds.	,,	4000
248.	N.I.V.*	,, ,, uncompressed, 4″ × 6 Yds.	,,	4500
249.	N.I.V.	,, many-tailed flannel	,,	1500
250.	N.I.V.*	,, muslin, No. 14, 4, 4″ × 6 Yds.	,,	1800
251.	N.I.V.*	,, ,, No. 14, 6″ × 6 Yds.	,,	3500

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
252.	N.I.V.*	Bandages muslin No. 14, 8″ × 6 Yds.	Nos.	1500
253.	1722*	,, suspensory	,,	300
254.	N.I.V.*	,, ,, T shaped, calico	,,	800
255.	1723*	,, triangular, uncompressed	,,	1200
256.	1724*	,, triangular compressed	Yds.	1400
257.	2311*	Cloth sheeting	,,	100
258.	1725*	First Field Dressings	,,	4000
259.	N.I.V.*	Shell Dressings	,,	7000
260.	1729–01*	Gauze, plain, uncompressed in 3 Yds. Pkts.	Pkts.	3000
261.	1730*	,, surgical, loosewove unmedicated 25″ wide	Yds.	18000
262.	1731*	,, surgical loosewove, unmedicated 25″ wide, in packets of 3 Yds.	Pkts.	300
263.	1734*	Lint, plain, 2 ozs.	,,	300
264.	1737*	,, ,, 1 lb. packets	,,	1000
265.	1738*	,, ,, compressed, 1 oz. pkts.	,,	1700
266.	1755–01*	Ligature, catgut, sterilised plain size 00, 0, 1, 2 & 3 (Ratio 2:2:2:1:1)	Tubes	500
267.	1755–02*	,, catgut, sterilised (chromic 20 days) sizes 0, 1 and 3 (in equal proportion)	,,	35
268.	1765–01*	,, catgut, sterilised cotton thread 6 cord No. 10	Reels	535
269.	1764	,, Silk opthalmic, unsterilised very fine, white, and black on reels (in equal proportion)	,,	30
270.	1765*	,, silkworm gut, sterilised, very fine, tubes of 50 threads	Tubes	100
271.	1739*	Preventive Packets	Nos.	6000
272.	1772	Tubing, drainage, large size 3/8″	Yds.	30
273.	1773	,, ,, ,, ,, 5/16″	,,	20
274.	1775	,, ,, ,, ,, ¼″	,,	20
275.	1777	,, ,, small size 1/6″	,,	20
276.	1778	,, ,, ,, ,, 1/8″	,,	20
277.	1779	,, ,, ,, ,, 1/16″	,,	20
278.	1780	Tubing, drainage, large sizes 1, 2, 3 in tubes	Tubes	21
279.	1743*	Waterproof tissue	Yds.	70
280.	1749*	Wool, cotton, absorbent 1 lb. pkts.	Pkts.	3000
281.	N.I.V.*	,, ,, ,, in 4 oz. rolls	Rolls	300
282.	1750–01*	,, ,, ,, in 2 oz. pkts.	Pkts.	3000

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
		(4) *Laboratory Equipment and sundries*		
283.	N.I.V.	Acetonum	Lb.	1
284.	1848	Acidum Hydrochloricum, pure, redistilled A.R.	,,	1
285.	1851	Acidum Nitricum, pure, redistilled A.R.	,,	1
286.	1855	Acidum Pyrogallicum heavy crystals	,,	½
287.	1857	Acid Sulphuric, pure, redistilled	,,	10
288.	1968	Agar, B.P. in shreds	,,	3
289.	1861*	Alcohol, dehydratum B.P.	,,	10
290.	1863*	,, Methyl, Acetone free	,,	20
291.	N.I.V.*	Ammonium Sulphate	Ozs.	2
292.	1881*	Benedict's solution	Lb.	4
293.	N.I.V.	Benzidine	Ozs.	1
294.	N.I.V.	Brilliant Green	Grams	5
295.	N.I.V.	Bromine Capsules, 2 cc.	Caps.	50
296.	1982	Canada Balsam	Ozs.	9
297.	N.I.V.	Chrysoidin	Grams	5
298.	1992	Congo Red (Bottles of 5 g)	Bottles	8
299.	N.I.V.	Crystal Violet	Grams	5
300.	1974	Dextrose (Glucose pure)	Lb.	4
301.	1975	Dulcite	Ozs.	½
302.	1995	Eosin, pure, tubes, of 5 g.	Tubes	8
303.	2021	Fuchsine, acid	Grams	5
304.	2022	,, pure	,,	45
305.	2023	Gentian violet	,,	45
306.	2025	Iodine (Grams)	Ozs.	6
307.	1978*	Lactose, pure	Lb.	2
308.	2004	Leishman's stain, in powder	Grams	45
309.	1980	Mannite	Lb.	1
310.	2007	Methylene blue, Gurr's	Grams	45
311.	2010	Methyl Violet 6-B (bottles of 5 gms.)	Bottles	1
312.	2011	Neutral red (bottles of 5 grammes)	,,	18
313.	1985	Oil aniline	Ozs.	8
314.	1986	Oil Cedarwood	,,	8
315.	2110	Paper, filtering, chardin's Pkts. of 100	Pkts.	2
316.	2111	Paper filtering, 6″ diameter pkts.of100	,,	10
317.	2112	,, ,, 10″ diameter pkts. of 100	,,	10
318.	2405	,, Litmus, blue, books	Books	30
319.	2406	,, ,, red, books	,,	30
320.	2409	,, wrapping, blue	Quires	25
321.	2410	,, ,, brown	,,	25
322.	2411	,, ,, white	,,	25
323.	N.I.V.	Para-dimethylamido-benzaldehyde	Ozs.	1/2
324.	1919–01*	Paris Green	Lb.	100
325.	1972	Peptone Powder	,,	2

APPENDIX V(a)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
326.	2427*	Pins, Common, 1 oz. packets	Pkts.	15
327.	2429	„ safety, 3 sizes, boxes of 30	Boxes	150
328.	2432	Plaster, adhesive, zinc oxide 10 yds. × 1″ on spools	Spools	400
329.	2434	Plaster, adhesive, zinc oxide 10 yds. × 6″ in tins	Tins	150
330.	N.I.V.	Plaster, adhesive, zinc oxide 10 yds. × 3″ on spools	Spools	300
331.	2437*	Plaster of Paris	Lb.	4500
332.	1924	Potassium Bichromate A.R.	Ozs.	4
333.	N.I.V.	„ Oxalate A.R.	„	4
334.	1935	„ Persulphate A. R.	„	2
335.	1981	Saccharose, pure	Lb.	4
336.	N.I.V.*	Soap, yellow, 2 oz. cakes	Cakes	150
337.	1945	Sodium hydroxide	Lb.	3
338.	N.I.V.*	„ „ N/10, solution	„	2
339.	1950	„ Nitroprussiate A.R.	Ozs.	1
340.	N.I.V.	„ Sulphite	„	1
341.	1953	„ Tauroglycocholate, B.P.C.	Lb.	1
342.	1987	Xylol, pure	„	5
343.	2504*	Water proof sheeting " Pluviusin " 4½ feet wide in rolls	Yds.	250
344.	N.I.V.	Wire, Kirschner's 1·5 m.m. × 10″ long	Lengths	300
345.	N.I.V.	Wire, Kirschner's 1·0 m.m. × 10″ long	„	150
		(5) *Vaccines and sera*		
346.		Anti-diphtheritic	Caps.	24
347.		Anti-dysenteric, Polyvalent	„	100
348.		Anti-Meningococcus	„	12
349.		Anti-rabic Vaccine	Courses	60
350.		Anti-streptococcus	Caps	24
351.		Anti-tetanus serum 500 (A.U.)	„	120
352.		„ „ „ 1,500 (A.U.)	„	1000
353.		„ „ „ 8,000 (A.U.)	„	100
354.		Conc. Gas Gangrene anti-toxin	„	60
355.		T.A.B. Vaccine 1 cc capsules	„	120
356.		„ „ 5 cc „	„	120
357.		„ „ 20 cc „	„	120

APPENDIX V (b)

U-B LIST 1941

(SHOWING REQUIREMENTS OF NON–EXPENDABLE ITEMS OF ONE DIVISION FOR SIX MONTHS)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
1.*	1525	Abduction frames for fractured femur	Nos.	1
2.*	1494–01	Air rings, rubber	,,	75
3.*	Down 1374/6	Air ways, anaesthetic, Robert's	,,	2
4.	Down 448/7	Apparatus, artificial, pneumothorax	,,	1
5.		,, blood transfusion, G.S. type complete	,,	6
6.		,, blood tranfusion, G.S. type spare bottles for	,,	110
7.*	1283	,, Carrel-Dakin	,,	7
8.*	1330	,, Cholera	,,	2
9.*		,, for abduction and extension for sound leg	,,	1
10.*		,, humerus reduction Bohler's	,,	1
11.*		,, nail extension, Steinomann's	,,	1
12.*	1358–01	,, Oxygen, cylinder covers, coir for	,,	10
13.*	1357	,, Oxygen cylinder valve key for	,,	10
14.*	1358	,, Oxygen fine adjustment or reducing valves for	,,	10
15.*		,, Oxygen Haldane's	,,	8
16.	1356	,, ,, pressure gauges for	,,	10
17.*	1346–02	,, saline infusion (Miniature cholera apparatus)	,,	20
18.	Down 833/6	,, Oxygen Supra-public, Irving's	,,	1
19.*		,, suspension, Sinclair's	,,	7
20.*		,, ,, ,, brackets, arm for	,,	7
21.*	1383	,, water testing, Horrock's	,,	8
22.*		,, wire extension, Kirschner's stirrups:—		
23.*		15·5 × 15·5 cms.	,,	3
24.*		13·4 × 14 cms.	,,	2
25.*		12 × 13·5 cms.	,,	2
26.*		9·5 × 11 cms.	,,	3
27.*	545	6 × 5 cms.	,,	2
		Aspirators, Potain's, complete	,,	5

APPENDIX V (b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
28.		Auriscope, electric	Nos.	1
29.		,, ,, batteries for	,,	5
30.		,, ,, lamps for	,,	5
31.	1392	Bags, ice, head, I.R.	,,	125
32.	1393	,, ,, spine, I.R.	,,	76
33.	2038	Balance, chemical, with metric weights	,,	1
34.	H92	Basin, chromium or nickel plated steel, 8″ × 5⅛″	,,	7
35.	2041	Basin, evaporating, Porcelain, size 3⅛″	,,	1
36.	2042	Basin, evaporating, Porcelain, size 4″	,,	4
37.*	2045	Baskets, iron wire	,,	1
38.*	2282	Baths, arm, E.I.	,,	2
39.*	1394	Batteries, Spamer's, induced current	,,	5
40.*	2049	Beakers, glass, without spouts (set of 5)	,,	10
41.*		Beams, Balkan, with wheels and pulley attachment	,,	2
42.*		Beds, net, Sinclair's with suspension frames	,,	1
43.*	555	Bistoury, hernia	,,	2
44.*	556	Bistoury, probe-pointed curved	,,	2
45.*	557	,, sharp-pointed ,,	,,	4
46.*	559	,, ,, straight with scoop	,,	2
47.	Baird & Tatlock	Blocks, glass, with excavation and covers, 2¾ square	,,	5
48.*		Blocks, slotted for bending	,,	1
49.*		,, wooden, pulley with hooks	,,	10
50.*		Blowers (Peerles dust gun)	,,	1
51.*	1408	Blow-pipes, dissecting, G.S.	,,	1
52.*	2837	Bottles, amber, stoppered round, N.M. 1 lb.	,,	2
53.	Weiss B-1108	,, drop chalk's, ½ oz.	,,	22
54.	2286	,, ,, chloroform, 2 ozs. in leathercase	,,	13
55.	2288	,, ,, chloroform 4 ozs.	,,	10
56.*	Down 2349/1	,, ,, ether, 6 ozs.	,,	10
57.*	2291	,, dropping 1 oz.	,,	12
58.*	2292	,, ,, 2 ozs.	,,	40
59.*	2813	,, green, round, stoppered, Winchester quart	,,	35
60.*	2778	,, green, stoppered, round N.M. 2 ozs.	Doz.	2
61.*	2788	,, green, stoppered,round W.M. 2 ozs.	No.	3
62.*	2833	,, green, stoppered,square, W.M. 2 ozs.	Doz.	8

APPENDIX V (b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
63.*	2832	Bottles, green, stoppered, square W.M. 4 ozs.	Doz.	10
64.*	2797	,, green, unstoppered, round N.M., 6 ozs.	,,	10
65.*	2796	,, green, unstoppered, round N.M., 8 ozs.	,,	12
66.*	2795	,, green, unstoppered, round N.M., 10 ozs.	,,	3
67.*	2793	Bottles, green, unstoppered N.M., 1 lb.	,,	3
68.	2293	Bottles, hot water, I.R.	Nos.	300
69.*		,, (McCartney's) 2 drachms.	,,	90
70.*		,, ,, 1 oz.	,,	56
71.*		,, ,, 2 ozs.	,,	30
72.*		,, ,, 6 ozs.	,,	30
73.*	2931	,, N.M. 1 oz., in nickel plated case for Iodine solution	,,	2
74.*	2894	,, practical, poison, dark blue, stoppered, N.M. 1 oz.	Doz.	5
75.*	2891	Bottles, practical, poison, dark blue, stoppered, N.M., 6 ozs.	,,	5
76.*	2909	Bottles, practical, poison, dark blue, unstoppered, 2 ozs. N.M.	,,	5
77.*	2908	Bottles, practical, poison, dark blue, unstoppered, 4 ozs. N.M.	,,	5
78.*	2059	Bottles vaccine, amber, 10 cc	Nos.	10
79.*	2537	Bottles water, with cup and strap	,,	16
80.*	2929	,, white, round, drop, 4 ozs.	,,	8
81.*	564	Bougies, urethral, metal, Lister's, set of 12	Set.	1
82.*	Allen & Hanbury 9362	Bowls, E.I. 4″	Nos.	8
83.*	A & H 9362	Bowls, E.I. 8″	,,	8
84.*	2294	,, ,, 10″	,,	10
85.*	2297–01	Boxes, dressing	,,	8
86.*	2069	Box, slides for 100 slides	,,	1
87.*	2299	Brushes, nail	,,	24
88.*	2300	,, ,, tin cases for	,,	6
89.*		Buckles 1″	,,	14
90.*		,, 2″	,,	27
91.*	2066	Burettes, 25 cc graduated in 1/10 cc with jet and pinchcock	,,	3
92.*	2065	Burettes, 50 cc graduated in 1/10 cc with jet and pinchcock	,,	2
93.*	2064	Burettes, 50 cc with stopcocks, graduated in 1/10 cc	,,	9

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
94.*	A & H 4965	Burs, nasal, Tilley's 4 mm, 6 mm and 8 mm	Nos.	1
95.*	1416–01	Cabinets, aseptic, for instruments with six shelves	„	3
96.*		Cages, Barraud's	„	3
97.*		Cages, breeding, 12" × 12" × 12"	„	1
98.*		„ pocket, 7 cm × 5 cm × 13 cm	„	2
99.	2070	Caps, I.R., for test tubes and flasks, sizes ⅝", ¾", 7/8", and 1⅓"	„	12
100.*	2564	Cases, canvas, for urinals, male	„	20
101.*	1415	Cases caustic	„	10
102.*	2569–01	Cases water testing poisons	„	4
103.	Down-820/6	Catheters, De Peszer's bladder	„	2
104.	586	„ G.E., cylindrical, aseptic ends, size 1 to 12	„	10 of each
105.*	590	Catheters G.S., male, solid ends, sizes 1 to 12	„	5 of each
106.	592	Catheters I.R., sizes 3 to 12	„	90 of each
107.	596	„ Ureter, for Cystoscopes	„	3
108.*	2074	Centrifuges, hand, high speed, with Haematocrite and 7 pairs of tubes	„	1
109.*	2079	Centrifuges, hand, sputum tubes for	„	3
110.*	604	Chisels, angular	„	1
111.*	601	„ bone, McEwan's, 5/16"	„	3
112.*	605	Chisels, cross handled	„	1
113.*	A & H 4399	„ mastoid, McEwan's	„	1
114.*	606	„ spinal	„	1
115.*	Down-1109/14	Clamps, colon, Rankin's	„	1
116.*	H-65	„ enterostomy, Doyen's 9"	„	1
117.*	609	„ intestinal, Carwardine's set of 2	„	1
118.*	610	„ „ Moynihan's	„	2
119.*	Down-872/5	„ pedicle, curved on flat 8"	„	1
120.*	Down-1210/1	„ stomach, crushing, Payr's	„	1
121.*	2606	Clasp knife	„	5
122.*	2073	Clips, burette	„	6
123.*	1417	„ metal Michel's, with forceps and hooks in case	Case	1
124.*	Down-66/7	„ towel, cross-action	Nos.	20
125.	B & T P.C.-1535	Comparators (Cole and Onslow's) standard tubes, resistance glass for	„	3

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
126.*	2077	Conical tubes for	Nos.	30
127.*		Containers, cream, anti-mosquito	,,	350
128.*		Cord, extension	Yds.	1125
129.	B & T SC-4152	Corks, assorted	Doz.	6
130.*	2035	Corks, I.R., with 2 holes, assorted, to fit flasks of 100 cc, 200 cc, 250 cc, 500 cc and 1000 cc	Nos.	5
131.	2312	Corks, phial	,,	2000
132.	2313	,, pint	Gross	5
133.	2314	,, quart	,,	5
134.	2315	,, wide mouth	,,	5
135.		Cork ring, coated with paraffin	Nos.	2
136.	Lawrence & Mayo	,, sheets, 11" × 4" × 1/16"	,,	3
137.	B & T H.P.-4	Cover glasses, microscopes, square, ¾" thickness about 1/100"	Gross	1
138.*		Cradles, Salter's	Nos.	10
139.*	1425	Crutches, French	Prs.	18
140.*	2575	Cups, E.I., 4 ozs. for Iodine	Nos.	2
141.*	2319	Cups, feeding, E.I.	,,	23
142.	2576	Cups medicine and mortar, combined vulcanite, with 2 pestles	,,	15
143.*	614–01	Curettes, adenoid, St. Clair Thompson's in 2 sizes	,,	2
144.*	61B	Curettes, ear, Hartmann's, large	,,	1
145.*	619	,, ,, ,, small	,,	1
146.*	2090	Cylinders, glass, 10 cc graduated in 1/10 cc	,,	5
147.*	B & T SC. 5046	,, glass, 25 cc graduated, with spout	,,	1
148.*	2091	,, glass, 50 cc graduated	,,	5
149.*	2092	,, ,, graduated, 100 cc	,,	1
150.*	2096	,, ,, 500 cc graduated with spout	,,	1
151.*	626–01	Cystoscopes, accumulators, portable, 2-4 volts, with Rheostat spare for	,,	1
152.*	627	Caps toscopes batteries for	,,	5
153.	626	,, without batteries	,,	1
154.*	630	Depressors, tongue, folding, G.S.	,,	3
155.*	652	Directors, hernia	,,	1
156.*	2102	Dishes (Petri), 15 mm deep, 3' diameter, in pairs	,,	50
157.*	2104	Dishes (Petri), 15 cm in diameter, in pairs	,,	5
158.		Dishes porcelain for plates, 8½" × 6½"	,,	9
159.*	1655	Dissector, with probes, Watson Cheyne's, fine	,,	6

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
160.*	1432	Douches, eye, " Undine ", 8 ozs.	Nos.	30
161.*	2325	Dredgers, vulcanite, 2 ozs.	,,	2
162.*	2580	Dressing cases, Orderly's	,,	10
163.*		Drill for introducing Kirschner's wire	,,	2
164.*		Droppers, 18 bores	,,	2
165.*		,, 30 bores	,,	3
166.*		,, 56 bores	,,	4
167.*	Down 1627/5	,, eye	,,	54
168.	1429	Douches, eye, glass	,,	12
169.*	Down 188/3	Elevator, Durameter, Horsley's	,,	1
170.*	H-66	,, ,, Sargent's	,,	1
171.*	665	,, Periosteal, Langenbeck's	,,	1
172.*	666	,, skull, double	,,	2
173.*	667	,, tooth, left, in fixed handle	,,	1
174.*	667	,, tooth, right, in fixed handle	,,	1
175.	667*	,, tooth, straight, in fixed handle	,,	1
176.*	2107	Enteric sample cases	,,	400
177.*	Down 1099/6	Enterotome, Paul's	,,	1
178.*	1683/01	Esmarch's rubber bandages	,,	8
179.*	2333	Files, cross-cut, triangular	,,	3
180.*	2334	Filtering stands	,,	1
181.*	2128	Flasks, boiling, resistance, flat bottomed 500 cc	,,	3
182.*	2115	Flasks, conical, resistance, 50 cc	,,	9
183.*	2116	,, ,, resistance, 100 cc	,,	2
184.*	2117	,, ,, resistance, 250 cc	,,	1
185.*	2118	,, ,, resistance, 500 cc	,,	1
186.*	2119	,, ,, resistance, 1000 cc	,,	3
187.*	2129	,, resistance, flat bottomed, 100 cc	,,	2
188.*		,, Round, flat bottomed, 100 cc	,,	1
189.*	675	Forceps, artery (Greig Smith's)	,,	5
190.*	676	,, ,, (Kocher's) 6″	,,	6
191.*	A & H 780	,, ,, Mayo Ochsner's	,,	20
192.*	H-101	,, ,, mosquito	,,	2
193.*	H-194	,, ,, 6″ screw joints	,,	4
194.*	Down 26/3	,, ,, skull-flap Sargent's	,,	2
195.*	679	,, ,, (Spencer Well's) 4¾″	,,	25
196.*	678	,, ,, ,, ,, 5″	,,	25
197.*	Down 28/11	,, ,, ,, ,, 7″	,,	16
198.*	677	,, ,, (Wakeley's) 5″	,,	1

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item		Unit	Quantity
199.*		Forceps	Blunt, straight entomological	Nos.	1
200.*	683	,,	Bones (Jensen's)	,,	5
201.*	792	,,	Bone holding 12½"	,,	1
202.*	791	,,	Bone holding 15½"	,,	1
203.*	634	,,	Bone, " Lion " (Ferguson's) 7½"	,,	3
204.*	688	,,	Bone, straight, without spring 8½"	,,	3
205.*	692	,,	Bullet	,,	1
206.*	Down/ 1086/3	,,	Chlecystectomy, Moynihan's	,,	1
207.*	Weiss B-844	,,	Cilia, Bennett	,,	1
208.*	2131	,,	Cover, Cornet's	,,	1
209.*	2130	,,	Cover glass	,,	1
210.*	H-64	,,	Craniectomy Victor Horsley's	,,	1
211.*	699	,,	dissecting, 6"	,,	14
212.*	Weiss. B-985	,,	dissecting, fine S.S.	,,	8
213.*	700	,,	dissecting rat toothed	,,	10
214.*	701	,,	dressing, screw joint 5"	,,	33
215.*	Mayor & Phelps 12543	,,	ear, crocodile, serrated points	,,	1
216.*	704	,,	ear dressing (Hartmann's)	,,	1
217.*	Weiss. B-904	,,	fixation curved, rounded teeth with stop, Land's S.S.	,,	1
218.*	H-84	,,	Gall bladder, Moynihans' 8"	,,	1
219.*	712	,,	Gouge (Hottman's) curved	,,	1
220.*	Down/ 1118/2	,,	intestinal, Clamps, Lane's twin pattern	,,	1
221.*	Weiss. B-845	,,	iris, straight blades S.S.	,,	1
222.*	Down 185/4	,,	laminectomy, Sargent's, 10"	,,	1
223.*	Down 442/2	,,	lung, Duval	,,	1
224.*	A & H 5151	,,	nasal, crocodile jaw for polypus etc.	,,	1
225.*	A & H 5125	,,	nasal, Lue's large, medium and small	,,	1
226.*	H-100	,,	Rat tooth, 5"	,,	1
227.*	193/3	,,	skull, Montenovesi's	,,	1
228.*	739	,,	sinus....	,,	10
229.*	742	,,	sponge holding	,,	1
230.*	743	,,	steriliser	,,	5
231.*	743/01	,,	tissue (Lane's) 6"	,,	20

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
232.*	Down 13511	Forceps tongue	Nos.	3
233.*	755	Forks, tunning, Gadiner Brown's C. 250	,,	1
234.*	756	,, tunning, Gadiner Brown's C. 2048	,,	1
235.*		Fracture, boards	,,	50
236.*		Fulcrum, Lorenz's	,,	1
237.*	2346	Funnels, glass 2 ozs.	,,	5
238.*	2347	,, ,, 4 ozs.	,,	8
239.*	2348	,, ,, 8 ozs.	,,	8
240.*	2134	,, ,, plain 2″	,,	1
241.*	2135	,, ,, ,, 7½″	,,	1
242.*	2137	,, glass ribbed ¾″	,,	9
243.		,, separating	,,	3
244.*	757-01	Gags, mouth, Doyen's Probyn-William's modification	,,	2
245.*	760	Gags, mouth, Mason's	,,	2
246.*	2349	Gallipots cup-chaped	Doz.	6
247.*	2352	,, flat-bottomed set of 4	Sets	4
248.*	2144	Gauze, wire, with asbestos centre piece 6″ × 6″	Nos.	4
249.	Weiss.B-1600	Glasses, dark smoked	,,	20
250.*	2354	,, urine, conical	,,	27
251.*	A & H 4434	Guide, Staecke's	,,	1
252.*	M & H 10970	Buillotines, tonsil, Heath's 3 sizes	,,	3
253.	2146	Haemocytometer, Barker's for enumeration of red and white cells	,,	1
254.*	772	Hammer's carnium	,,	1
255.*		Handkerchiefs, cotton	,,	12
256.*		,, silk	,,	2
257.*		Handles, applicating for pints	,,	1
258.*		,, for apparatus, nail extension	,,	2
259.*		Holders, wooden, for No. 4 specimen tubes	,,	2
260.*	Weiss. B-890	Hook, strabismus, Graefe's medium	,,	1
261.*	Weiss. B-794	Hook, strabismus Moorfield's pattern	,,	1
262.*	781	,, and chains, set of 3	,,	1
263.*	1449-01	,, aseptic, for cabinets	,,	9
264.*		,, for attaching to stirrups	,,	6
265.	2153	Hydrometer, 700 degrees to 800 degrees	,,	1
266.	2154	,, 800 degrees to 900 degrees	"	1

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
267.	2155	Hydrometer 900 degrees to 1000 degrees	Nos.	1
268.	2156	,, 1000 degrees to 1200 degrees	,,	1
269.*		,, Inhalers, Barney Yeo's	,,	50
270.*	1462	,, moist air maws	,,	26
271.*	Down 1342/7	,, schimmelbusch	,,	6
272.*	1468	Irrigators, E.I. 1·2 pints, with vulcanite nozzle	,,	9
273.*	Down 1586/1	,, glass, containers, 2½ gallons	,,	2
274.*		,, ,, nasal	,,	50
275.*	A & H 9484	Jars, for dressings, E.I. with cover 8″ × 8″	,,	15
276.*	9484	,, ,, ligature, E.I. 4″ × 4″	,,	7
277.*	Down 3145/5	,, lotion, E.I. 2 gallons with bung bent glass tubes pushcock and I.R. tubes	,,	15
278.*	A & H 9516	Jugs, E.I. graduated 1 pint	,,	4
279.*	A & H 9516	,, ,, ,, 2 pints	,,	4
280.*		Kettles for steriliser, Schimmelbusch, 20″ × 8″	,,	14
281.	A & H 670	Knife, Bard Parker blades for, in packets of 6	Pkts.	85
282.*		,, plaster, Guy's	Nos.	2
283.*	879	Knives, amputating Liston's	,,	2
284.*	A & H 671	,, Bard Parker handles No. 3 for	,,	14
285.*	A & H 672	,, ,, ,, No. 4 for	,,	15
286.*	A & H 673	Knives, Bard Parker, handles No. 5 for	,,	3
287.*	2371	Labels, poison, large	Sheets	300
288.*	2372	,, ,, medium	,,	300
289.*	2373	,, ,, small	,,	300
290.*	2165	Lactometer with immersion cylinder in case	Nos.	1
291.	2168	Lamps, blow-pipe, paraffin 1 pint	,,	1
292.*	1480	,, Electric, Hand	,,	20
293.*	2173	,, spirit, brass, 1 oz.	,,	9
294.*	2174	,, ,, glass, 2 ozs.	,,	2
295.	1486	Lens, for skin examination, 10″	,,	2
296.*	down 1340/3	Masks, ether, Ogston's	,,	1
297.		Mats, I.R. for draining	,,	2
298.	1486-06	Mattresses, " Dunlopillo " Latticed, 4″ thick 6″ × 3″	,,	20

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
299.*	2385	Measures, glass 2 ozs.	Nos.	5
300.*	2386	,, ,, 4 ozs.	,,	5
301.*	2387	,, ,, 4 ozs. in case	,,	14
302.*	2388	,, ,, 8 ozs.	,,	2
303.*	2289	Measures, glass 1 lb.	,,	2
304.*	2178	Measures glasses, 10 cc graduated 1/10 cc	,,	5
305.*	2177	,, ,, 50 cc graduated in 1 cc with spout	,,	5
306.*	2381	Measure glass, minim.	,,	6
307.*	2382	,, ,, ,, in case	,,	12
308.*	2383	,, ,, ,, and tumbler in case	,,	9
309.*	2391	Measure, metal, double ½ oz. and 1 oz.	,,	7
310.*	2396	,, metal 2 lb.	,,	1
311.	2182	Microscope with 2 eye pieces, Watson's service pattern	,,	5
312.*		Mixers	,,	1
313.*		Mosquito netting, fine black	Yd.	1
314.*		,, ,, ,, white	,,	1
315.*	1463 down	Mouthpieces for, Inhalers Moist Air Maws	Nos.	26
316.	1386/9	Mouth, props, Hewitt's with I.R. pads	,,	3
317.*	2398	Mugs, earthenware with handle 2 ozs.	,,	52
318.*	924	Myringotomes, Hartmann's	,,	1
319.*		Nails ¾″	Lb.	23
320.*		Nails 1″	,,	23
321.*		Nails 2″	,,	23
322.*	932	Needle-holders, Matrin's	Nos.	7
323.*	Weiss B-994	,, ,, Silcock's S.S.	,,	1
324.*		,, ,, soft-wood	,,	3
325.*	Weiss B-564	,, cornea foreign body Jacob's S.S.	,,	5
326.	3132	,, interchangeable Schimmel's (tubes of 6 needles)	Tubes	2
327.*	2399	,, packing	,,	24
328.	2610–02	,, straight No. 7	,,	1
329.	Weiss B-584	,, suture ophthalmic, half curved, triangular small	Pkts.	14
330.*	990	,, with handles, curved Doyen's No. 1	,,	4
331.*		Net, hand, for larvae collection	,,	2
332.*	993	Nippers, wire for sutures	,,	1
333.*		Outfits, water sterilising individual	,,	88
334.*	2401	Pans, bed E.I. slipper, shaped	,,	10
335.	2407	Paper, paraffin	Sheets	230

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
336.		Pencils, copper, sulphate, in wooden holder	No.	1
337.	2419	Pestles and mortars, composition 4 ozs.	,,	2
338.	2420	,, ,, ,, ,, 8 ozs.	,,	2
339.	2421	,, ,, ,, ,, 1 lb.	,,	2
340.	2204	,, ,, ,, glass 2″	,,	1
341.	2423	,, ,, ,, 8 ozs.	,,	3
342.*	2425 2426	Pill boxes, various	Gross	5
343.	L & M	Pins, entomological fine double pointed (Tayler's No. 3)	Oz.	1
344.	,,	,, ,, pure nickel, No. 16	,,	1
345.*		,, for apparatus, nail extension	,,	60
346.*		,, transfixion, stainless steel 6″ × 4 mm.	,,	90
347.*		,, ,, ,, 6″ × 6 mm.	,,	270
348.*		,, ,, ,, 8″ ×4 mm.	,,	180
349.		Pipettes, 0·2 cc graduated in 1/1000 cc to outlet	,,	2
350.	2208	,, 1 cc graduated to outlet in 1/100	,,	2
351.		,, 1 cc graduated in 1/10 cc to outlet	,,	4
352.	2210	,, 5 cc graduated in 1/20 cc	,,	2
353.	2211	,, 10 cc graduated in 1/10 cc	,,	3
354.*	B & T WTA 8292	Pipettes (Dreyer's)	,,	2
355.	2148	,, for red corpuscles with mouthpieces	,,	1
356.	2149	,, for white corpuscles with mouthpieces	,,	1
357.	L & M	Pith in 4 ozs. pieces	,,	8
358.	2215	Plasticine	Lb.	5
359.*	801	Plates, steel, elbow shaped, sizes 1-3	Sets.	6
360.*	802	,, ,, patella, straight sizes A-D	,,	8
361.*	803	,, ,, rigid set of 5	,,	2
362.*	804	,, ,, semaphoric, sizes 1-3	,,	6
363.*	805	,, ,, straight, size 1-11-A	,,	26
364.*	806	,, ,, triangular, shaped sizes 1-3	,,	6
365.*	807	,, ,, Y-shaped, size 1-3	,,	6
366.*	2216	Platinum wire in glass holders	Nos.	3
367.*	Down/ 1369/2	Porters' local and spinal anaesthetic outfit, complete	,,	2
368.*	2442	Pots, delf with cover 2 ozs.	Doz.	2
369.*	2443	,, ,, ,, 4 ozs.	,,	2
370.*	2444	,, ,, ,, 8 ozs.	,,	2
371.*	2445	,, ,, ,, 1 lb.	,,	2

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
372.*	1006	Probes, bullets, silver 10″	Nos.	7
373.*		Racks for Kahn Tubes, each holding 40 tubes of 10 in a row, the middle Row being offset	,,	1
374.*		Racks, Wasselmarn........	,,	1
375.*		,, wooden, for larvae	,,	3
376.*		Radius and Ulna redirection apparatus, Bohler's	,,	1
377.*	808	Raspatories	,,	2
378.*	Down 144/7	Raspatory, rib, Doyen's	,,	1
379.*	1014	Razors, all metal	,,	19
380.	H-26	,, safety	,,	6
381.*	Down 237/7	,, skin, grafting, large	,,	1
382.*		Reddesseur, Bohler's	,,	1
383.*	Weiss B-720	Repositor, Iris, solver Nettleship	,,	1
384.*	1019	Retractor, abdominal Doyen's	,,	3
385.*	1020	,, Check	,,	1
386.*	1028	Retractors, mastoid, Wagner's	,,	1
387.*	Weiss B-47	Retractors, eyelid, small, Desmarre's German silver	,,	1
388.*	Down 56/4	,, Morris, single, 1½″	,,	3
389.*	Down 56/6	,, Morris, single, 2½″	,,	3
390.*	2448	Rods, glass, 9″	Doz.	2
391.*	2223	,, glass, stirring size 4	Nos.	2
392.*	Weiss B-1125	,, ointment, glass, plain	,,	1
393.*	2449	Roller for bandages	,,	5
394.*	Down 146/2	Rugine, Fareboeuf's curved	,,	1
395.*	2631	Sandbags, empty 16″ × 6″	,,	16
396.*	2630	,, ,, 26″ × 6″	,,	35
397.*	2629	,, ,, 36″ × 6″	,,	16
398.*	1036	Saw, amputating, with spare blade	,,	3
399.*	1037	,, finger	,,	4
400.*	1042	,, Gigli's, handles for	,,	1
401.*	1044	,, Gigli's steel conductor for	,,	1
402.*	1043	,, Gigli's threads for	,,	15
403.*	1040	,, Post mortem	,,	2
404.*	2456	Scales, and weights, Druggist's, ½oz. to 4 lbs.	,,	2
405.*	2457	,, weights for	Sets	2
406.*	2458	,, pillar, grains and drachms in case	No.	1
407.*	1049	Scalpels, ordinary	,,	4

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
408.*	A & H 1832	Scissors, blood transfusion	Nos.	6
409.*	1057	„ dissecting, 5″	„	5
410.*	1056	„ „ 6″	„	5
411.*	1063	„ „ curved on flat 8″	„	1
412.*	1062	„ „ „ blunt pointed 5½″	„	29
413.*	Down 113/7	Scissors, dressing, curved, sharp pointed 5″	„	8
414.*	1066	Scissors, dressing, straight	„	6
415.*	1064	„ „ straight, blunt pointed 5″	„	12
416.*	Weiss B-1015	„ extension straight, strong	„	1
417.*	1070*	„ intestine, post-mortem	„	1
418.*	Weiss B-1047	„ iris, straight, sharp pointed	„	1
419.*		„ Mayo, 8″	„	1
420.*	1079	„ Shop, 6″	„	44
421.*	Weiss B-1040	„ Strabismus, blunt, pointed, long shanks	„	1
422.*	A & H 891	„ surgical, curved on flat, blunt pointed 9″	„	4
423.*	A & H 879	„ surgical, straight sharp pointed 7″	„	4
424.*		„ for wet slabs, Down's	„	2
425.*	M & P 12670-D	Scoops aural, Heath's small	„	1
426.*	M & P 1151	„ Ballance's, double, fine, combined with curette	„	1
427.*	1090	„ Volkmann's, double	„	2
428.*		Screws, 1″	Lb.	18
429.*		„ 1½″	„	23
430.*	812	„ assorted, direct screwing sizes 1-12	Doz.	8
431.*	813	„ „ for plates size A=M	„	4
432.*		Shades, dye, double	Nos.	164
433.*		Shears, Lorenz's	„	2
434.*	1095	„ rib, long handle	„	2
435.*	1502	Sheeting, perforated zinc	Sheets	36
436.*		Sigmoidoscope, batteries, for	Nos.	5
437.*	1503	„ with electric lamps	„	1
438.*	2461	Silk, green	Yds.	5
439.	2465	Slabs, Wedgewood	Nos.	2
440.*	2464	„ vulcanite, 8″	„	1
441.*	2227	Slides, microscope	„	1288
442.	2229	„ „ specially thin for dark ground works	Doz.	1

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
443.	2228	Slides, microscope with central depression	Doz.	5
444.*	1099-01	Snares, wire, spare wires for	Bundles	3
445.*		Soft iron wire, french, size 6 or 7	Lb.	45
446.		Spare bags for apparatus, Nitrous Oxide, Oxygen, and Ether Boyle's	Nos.	2
447.		,, for Nitrous Oxide apparatus	,,	2
448.*	2467	Spatulas, bolus, 5″	,,	3
449.*	New India Scientific Apparatus Co.	Specimen tubes, 3″ × 1″ with velvet corks (without cracks and not less than 7/8″ long)	Gross	2
450.*	1508	Speculum, aural, Brunton's	Nos.	5
451.*	Weiss B-303	,, eye, outside spring H. Smith's	,,	1
452.*	M & P 11671-A	Speculum, nasal, Thudichum's	,,	2
453.	1522	Sphygmomanometers, Bercurious	,,	1
454.*	H-30	Spirit stove	,,	3
455.*		Splints, aeroplane, for humerus, right and left	,,	1
456.*	H-87	,, alumininum, gutter shaped	,,	3
457.*	1529	,, arm Middledorpf's	,,	6
458.*	1535	,, ,, wooden, angular, set of 2	Sets	3
459.*	1538*	,, ,, and forearm, wooden, set of 9	,,	3
460.*		,, Braun's, Bholer's modification, 4 pulley model	Nos.	7
461.*	1542	,, elbow, skeleton, Jones	,,	5
462.*	1544	,, hand, long, dorsiflexion Jones	,,	5
463.*	1547	,, humerus, extension Jones' large medium and small reversible for right or left	,,	10
464.*	1549	,, knee, Thomas, set of 6	,,	24
465.*	1551	,, ,, ,, heel clips for	,,	11
466.*	1552	,, ,, ,, Jones' anklet with screw extending attachment for	,,	4
467.*	1553	,, knee Thomas' leather anklet for	,,	7
468.*		,, ,, ,, metal footpiece and support for	,,	5
469.*		,, ,, ,, Pearson's flexion for	,,	7
470.*	1550	,, ,, ,, sliding footpiece for	,,	16
471.*	1555-01	,, leg Cline's wire, R & L	,,	4

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
472.*		Splints leg Neville's with straps, medium and large	Nos.	1
473.*	1560	,, ,, and thigh, Liston's Aluminium with extending thigh piece	,,	10
474.*	1563	,, pad cases for	,,	14
475.*		,, radius, Carr's	,,	3
476.*	1565	,, tapes with buckles for	,,	30
477.*	1568	,, thigh Hodgeson's, complete right and left	,,	6
478.*		Splinting malleable steel 25″ × ½ × ⅛″	Length	90
479.*		,, wire, Kramer's, 60 × 8 cms.	,,	240
480.*		,, wire, Kramer's, 100 × 10 cms.	,,	360
481.*	1575	,, wood, Gooch's	,,	68
482.*	2473	Spoons, N.S. desert	,,	10
483.		Sprayer, " Eclair " No. 2 model, Knapsack model sprayer (Vermorel) 3½ gallons	,,	1
484.*		Sprayer, hand (MISH)	,,	8
485.*	1579	Sprays, nasal	,,	12
486.		Sprays, tannic acid	Nos.	16
487.*	Weiss B-561	Spud, eye	,,	1
488.*		Stage tubes	Doz.	3
489.*	2068	Stands, burette, double	Nos.	3
490.*	2233	Stands, test tubes, wooden 12 holes	,,	6
491.*	1586	Sterilizer for water with tripod and ' Primus ' stove No. 100	,,	4
492.*	1587–02	,, miniature, Gibbs	,,	4
493.*		,, Schimmelbusch 20″ × 8″	,,	4
494.*	Down 3218/1	,, steam high pressure, drums deep for	,,	5
495.*	Down 3218/3	Sterilizers steam, high pressure, drums shallow for	,,	9
496.	1599	,, steam, high pressure, stoves " Primus ", with 4 burners for	,,	1
497.*	1592	Sterilizer 14″ × 7″ with spirit lamp and 2 kettles (Schimmel busch)	,,	1
498.*	1602	Stethoscopes, binaural	,,	7
499.*		Sticks, walking	,,	12
500.*	2240	Stills, copper, 1 gallon	,,	1
501.*		Stirrups, Bohler's large to fit 4 mm. pin	,,	7
502.*		,, ,, small to fit 4 mm. pin	,,	9
503.*		,, ,, ,, to fit 6 mm. pin	,,	9
504.*		,, extension, Finochietti's	,,	2

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
505.*		Stirrups, slotted, with lateral pressure pads	Nos.	3
506.*		„ walking, for plaster casts 8″	„	11
507.*		„ „ „ „ 20″	„	11
508.*		„ „ „ „ 25″	„	6
509.*	2478	Stone slips Arkansas	„	1
510.*	2479	Stopper looseners No. 4	„	16
511.*	2242	Stove " Primus " No. 100	„	16
512.*	2244	„ „ nipples for	„	2
513.	H-63	„ „ travellers	„	2
514.*		Strainer for making wire tense	„	1
515.*	2482	Strops, leather	„	7
516.*	1605	Suspension bars for stretchers	„	10
517.*	Down 359/6	Swabs, Nasopharyngeal (West's), large	„	2
518.	1622	Syringes, enema Higginson's without nozzle	„	20
519.*	1625	„ „ vulcanite nozzle for	„	25
520.	1627	„ exploring, all glass, 80 minims.	„	10
521.	1630	„ hypodermic, all glass, 20 minims.	„	10
522.	1632	„ hypodermic, all metal, 20minims	„	20
523.	3059	„ „ all metal washerless D.M.Co's with spanner and nozzle " B " and " C " complete	„	1
524.	3059–01	„ „ washerless, nozzle, " B " for	„	2
525.	3059–02	„ „ „ „ " C " for	„	2
526.	3059–03	„ „ „ „ plunger ends for	„	2
527.	1639	„ ' Record ' 2 cc with trocar and canula in case	„	2
528.	1639–11	„ „ 5 cc	„	10
529.	1639–12	„ „ 10 cc marked in 0·5 cc	„	6
530.	1639–01	„ „ 20 cc „ „ 1 cc	„	10
531.	1639–10	„ „ „ „ „ 0·2 cc	„	1
532.	H-32	„ serum record 10 cc.	„	8
533.*	1649	„ wound, metal 4 oz.	„	10
534.*	2483	Tapes broad, pieces of 18 yds.	Pieces	250
535.	Down 1402/4	„ measuring Chesterman's 5 ft.	Nos.	6
536.*	2484	„ narrow, pieces of 18 yds.	Pieces	110
537.	2246	Teats, I.R.	Nos.	16
538.*		Test tubes, 2″ × ½″ Felix Technique	Doz.	6
539.*	B & T WSD-6290	„ „ 4″ × ½″	„	9

APPENDIX V(b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
540.*	2248	Test tubes 6"×¾"	Nos.	20
541.*	New India Scientific Apparatus Co.	,, ,, 6"×⅝" rimless	,,	2
542.*		,, ,, 9" × 1"	,,	2
543.	2164	Thermometers for Hearson's incubator	,,	1
544.	2485	Thermometers, bath	,,	16
545.	1680	,, clinical	,,	200
546.	2252	,, degree to 110 degrees centigrade	,,	1
547.	2253	,, ,, to 200 degree centigrade	,,	1
548.*	2635	Thread, sewing, tablet	Doz.	25
549.*		Tibia and Fibula reduction apparatus Bohler's	,,	1
550.	2486	Tin opener with folding corkscrew	Nos.	6
551.*	H. 53	Tourniquets, I.R. Sanway's	,,	8
552.*	A & H 9381	Trays, catheters, E.I., with lid, 16" × 3" × 2"	,,	8
553.*	H. 91	,, 8" × 5½" (Chromium or metal plated steel)	,,	3
554.*	H. 95	,, 9½" × 6¾" (Chromium or metal plated steel)	,,	3
555.*	593	,, developing 10" × 8" enamelled Iron	,,	1
556.*	2486-01	,, dressing	,,	14
557.*	2487	,, ,, kidney-shaped, set of 3	Sets.	22
558.	2660	,, ,, ,, vulcanite	Nos.	10
559.*	A & H 5888	,, ,, Manchester	,,	1
560.*	2489	,, instrument, E.I. (set of 2)	Sets.	9
561.*	2488	,, instrument, E.I. 12" × 8"	Nos.	11
562.*		,, slide (Cardboard) for 20 slides	,,	3
563.*	1130	Trephines, Horsley's conical ¾"	,,	2
564.	2254	Triangle, pipe clay	,,	1
565.*	2261	Tripods, triangular top	,,	2
566.*	1138	Trocar and canula, Hydrocele	,,	2
567.*	B & T WTA 8295	Tubes, agglutination (Dreyer's)	,,	72
568.	1697	,, empyema, shielded, I.R.	,,	9
569.*	B & T WTA 8296	,, dilution (Dreyer's)	,,	20
570.*		,, for patients' serum 3" × ¼"	,,	75

APPENDIX V (b)—(*Contd.*)

Serial No.	PV Item No.	Name of Item	Unit	Quantity
571.*	Down 1360/5	Tubes, introducing forcep Magill's	Nos.	2
572.		,, Kahn antigen mixing $2'' \times \frac{3}{5}''$ with flat bottoms	,,	4
573.		,, ,, test, $3'' \times \frac{1}{2}''$	,,	150
574.	1698	,, Paul's large intestine with I.R tubes	,,	5
575.	1699	,, ,, ,, ,, ,, ,,	,,	5
576.	A & H 9258	,, rectal, flatus, size 24	,,	16
577.	A & H 9257	,, ,, ,, ,, 20	,,	16
578.	1704	,, stomach I.R. with I.R. funnel and gag	,,	12
579.*	1144	,, trachotomy, bivalve silver	,,	15
580.		,, Wassermann, reaction $2\frac{1}{2}'' \times \frac{1}{4}''$	,,	225
581.*	2269	Tubing glass, $\frac{3}{8}''$ diameter inside 12″ long	Lb.	5
582.		,, soft soda, glass $\frac{1}{8}'' \times \frac{3}{4}''$	,,	2
583.*	1147	Tweezers, dental	,,	1
584.	Weiss B-1450	Types, reading, Jaegar's, in wooden frames	,,	1
585.*		,, reading Urdu & Hindi	,,	1
586.		,, test, distant vision army pattern set of 4 cards	Set	1
587.	Weiss B-1487 B-1488	Types, test, distant vision for illiterates	Nos.	1
588.		Type test, distant vision, Urdu and Hindi	,,	1
589.*	Weiss B 1099	Undines, metal, Elliot's	,,	1
590.		Urea apparatus, Ambard's	,,	2
591.*	2498	Urinals, E.I. male	,,	10
592.*	2271	Urinometer, glass, in case	,,	1
593.		Valves, reducing, for Nitrous oxide cylinders	,,	1
594.*	2274	Watch glasses	,,	54
595.*	2502	Waterproof sheeting, I.R. thick quality 57″ wide, in rolls	Yds.	180
596.*		Webbing, 1″	,,	225
597.*		Webbing, 2″	,,	450
598.*		Wire silver	Reels	10
599.*	866	Wool carrier	Nos.	2

APPENDIX VI

Eastern Group Conference

Report on Medical Stores.
Dated 6th November, 1940.

Report by No. 3 Sub-Committee of No. 2 (General Stores) Committee

Chairman..................Col. E. Wood, M.C. India
Secretary...........H. Roy-Gollan, Esq., Australia D.S.O., M.C.

As regards the manufacture of Medical Stores, the picture presented by the Eastern Group of Territories is one of self-insufficiency. Not only is the Group as a whole dependent in a preponderating degree on Europe and the Americas for meeting the normal requirements but no one Territory is self-supporting from its indigenous manufactures. On the other hand, certain parts of the Group have industries dealing with ever increasing ranges of manufactured items for which their production is progressively expanding and other produce large quantities of raw or semi-fabricated materials that are intrinsically valuable for the manufacturing stages. It is, however, true to forecaste that, whatever the course of this war, there is little probability of the Eastern Group becoming self-supporting within that period.

2. An investigation into this subject is attended by peculiar difficulties. The number of items listed under drugs and medicines is truly formidable and it was obvious that if the Sub-Committee was to report within reasonable time, it could not examine a list of the dimensions of the British Pharmacopoeia. It was accordingly decided to give a focus to the problem by attempting to examine a list of " essential " drugs. This term has a generally recognised meaning in the medical profession, but a further difficulty encountered was that the number of essential drugs for each of the several Territories varied enormously. One country set its figure at 130, another at 550, and a third at 3,000 etc. The Sub-Committee, therefore, decided to constitute a small panel of three experts who were given the duty of reviewing the lists of essential drugs of the various Territories and of reducing them to the smallest possible common denominator. The result was a list of 122 items which the Sub-Committee accepted as sufficient for its investigations. The items of this list are shown in the Appendix attached to this report. But it was found that even with this reduced list the majority of the Delegates were unable to return any reasonable amount of information. The result of this portion of the enquiry is that both Australia and India have exportable surpluses of various items and South Africa has a sufficiency of manufacturing capacity of certain items to meet her own need. The surpluses of Australia number 21 and those of India 56 in respect of the items chosen for review and the details for all the three countries are shown in the Appendix. These three Territories constitute the only

ones in which the manufacture of drugs has reached any reasonable stage. But it is to be noted that many of these are composite items. That is to say, their manufacture depends partly or wholly on imported ingredients and in this regard it is to be noted that for the establishment of a drugs and chemical industry, supplies of sulphur are predominantly important.

For the purpose of this report, and at the request of the Burma Delegation, the position of India and Burma was considered as one unit and for this reason the Indian figures were increased by two and a half per cent to cover this arrangement.

In addition to a consideration of essential drugs, the Sub-Committee carried out a general review of the further following items of medical stores:—

(a) Dressings & Ligatures.
(b) Surgical Instruments.
(c) Appliances.
(d) X-ray and other Electro-Medical Equipment.
(e) Dental Equipment.
(f) Rubber Goods.
(g) Glassware.

3. PART I

ESSENTIAL DRUGS

The extent to which Australia, India and South Africa can assist in the supply of essential drugs is reflected in the preamble to this report and in the attached Appendix. Other Territories form the source of raw and semi-fabricated materials and some indication of the position is given below.

Ceylon produces none of the drugs mentioned in the Appendix. Although not included in the list of essential drugs, Ceylon is a valuable source of Oleum Citronella and of Cinnamon.

East Africa has an exportable surplus of Oleum Arachis equivalent to 20,000 tons of groundnuts. Export of Pyrethrum flowers in 1939 amounted to 3,000 tons and Kenya Pyrethrum contains the highest percentage of pyrethrins found anywhere. Tanganyika can produce annually the equivalent in Cinchona bark of 2⅓ tons of the total alkaloids of Cinchona. No factory is available in East Africa for the extraction of the quinine salts from Cinchona, but this might be done in India where there are two Government factories. The Magadi Soda Company, Kenya, under the direction of the Imperial Chemical Industries, manufactures bicarbonate of soda, but no details of the output are available.

Malaya is unable to produce drugs to the B.P. quality. It is a valuable source of Benzoin and crude Arsenious Oxide.

The Netherlands East Indies has an exportable surplus only in two items, about 6,000 tons of Cinchona bark and about 180 tons of crude quinine and quinine salts are yearly available for export. About

2,500 kgms. of Oleum Ricini and about 6,000 tons of Oleum seeds are yearly available for export.

New Zealand does not produce any raw materials for drugs. All her requirements are imported.

Palestine has no production at present of any of the essential drugs under review. Production of the following synthetic drugs is being established:—

Pamaquin (Plasmoquine).
Sulphonamide.
Phenobarbitone (Luminal).
Hexobarbitone (Evipan).
Mepacrine Hydrochloride (Atebrin).

Production will begin about March, 1941. Capacity two to three tons of each drug annually which will provide for local requirements and will leave an exportable surplus. The preparation of other drugs such as Insulin, Adrenalin, Ephedrine and Cardiazol (Pentamethyeme tetrazol) is planned but no specific date can be given of when production will commence. There are a dozen factories engaged in the Pharmaceutical Industry, their chief products being pharmaceutical and medical preparations from imported drugs.

Southern Rhodesia: There is no local production of drugs in Southern Rhodesia.

4. PART II

BIOLOGICAL PRODUCTS

These comprise sera, vaccine and organometallic compounds. The Commonwealth Serum Laboratories of *Australia* produce large quantities of a comprehensive range of biological products, bacterial sera, bacterial vaccines, Insulin, Pituitary Extracts, Jennerian Lymph, Tuberculins, Thyroid tablets etc. All items included in the Commonwealth Serum Laboratories Catalogue are available for export. In regard to supplies of these products for export, the following points are to be carefully noted:—

(a) Large quantities of expensive bacteriologicals cannot be prepared in anticipation of orders as these products are highly perishable. Orders should be forwarded periodically with adequate notice.

(b) The time taken to meet export orders depends on the quantities available after Australia's and New Zealand's requirements have been met. This is an additional reason for placing orders in advance.

None of these preparations are made in *Ceylon, Malaya, New Zealand* and *Southern Rhodesia. East Africa* produces sufficient vaccines and sera for its own use except special cases such as for yellow fever. *India* has at least one reputable private firm making sera but Government supplies hitherto have been imported from England. With the introduction of the Drugs Act, 1940, which controls the manufacture of sera on the lines of the Therapeutic Substances Act of Great Britain, it is hoped to obtain supplies of sera in India in the near future. Vaccines are made in India in Government Institutions as well as by a few private firms. Government supplies of Plague, Cholera and T.A.B. vaccines meet all India's requirements and large quantities could be exported on notice being given while the same applies to small-pox vaccine lymph. Small quantities of the following have been made in India to produce:—

Injecto Bismuthi.
A preparation of the same composition as Neoarsphenamine.
Organic compounds of Antimony such as Ureastibamine for treatment of Kala Asar but no exportable surplus is yet available.

The *Netherlands East Indies* produce sera and the production can be enlarged if necessary. The production of sera in *Palestine* is planned but no specific date can be given when production will commence. The *Union of South Africa* produces vaccines and sera. No data regarding output are available.

5. PART III

LABORATORY CHEMICALS

Attempts have been made in *India* to produce laboratory chemicals of analytical reagent quality and bacteriological media. The former are produced on a small scale. As laboratory chemicals are only required in small quantities, these firms might be able to supply other countries in some of these items. Peptons powder is produced in sufficient quantity for India's needs. Many of the firms and laboratories make most of their own culture media. *Australia* is able to produce an exportable quantity of Gelatine which come under the heading " Culture media ". None of the other countries produce laboratory chemicals or media. So far none of the countries represented in the Eastern Group manufactures stains for bacteriological use.

6. PART IV

DRESSINGS AND LIGATURES

Australia imports her requirements of surgical dressings. A certain amount of cotton lint is made in Australia, but the raw material for this manufacture is imported. Two Australian Companies are arranging to manufacture adhesive plasters and hope to be able to start production in 1941 but the raw materials for the manufacture of these plasters have, to a large extent to be imported. Australia is a large producer of Catgut ligatures. Output is approximately five million feet per annum only half of which is required for her own requirements. The quantity produced can be readily increased to ten million feet per annum. The chief difficulty in production is the supply of glass tubing which at present is all imported.

Ceylon and East Africa have no production of surgical dressings or ligatures.

Cotton bandage cloth and surgical gauze are made on an extensive scale in India and it is anticipated that with some organisation the Indian mills can meet all India's own demands both civil and military and provide an exportable surplus which the Sub-Committee dealing with textiles is estimating. Flannel has become scarce in India and a barely sufficient quantity is produced for India's own requirements. First Field Dressings and Shell Dressings are manufactured in India from indigenous materials with the exception of Acriflavine and safety pins which have still to be imported. The present manufacturing facilities are sufficient for India's present commitments only, although output could be increased quickly subject to supplies of Acriflavine and safety pins being available. The manufacture of cotton lint on a considerable scale has been undertaken in India. It is anticipated that Indian mills can expand their production to meet present known commitments, and an exportable surplus will be possible later. The raw material for the manufacture of surgical absorbent cotton wool is obtained in India in quantity, but the necessary bleaching materials have still to be imported. An exportable surplus can be made available. No adhesive or elastic bandages are made in India at present, but a factory is in the process of erection and it is hoped to begin production before the end of 1940.

Surgical dressings are produced by eight factories in *Palestine* of which five manufacture absorbent cotton wool and three make gauze and bandages. Combined capacity is 30 tons cotton wool monthly and 800,000 sq. yds. of gauze monthly.

Surgical dressings and ligatures are not manufactured in *Malaya, The Netherlands East Indies, New Zealand* or *Southern Rhodesia.*

7. PART V

SURGICAL INSTRUMENTS

With the exception of optical and illuminated instruments, suture needles, scissors, detachable blades of Baird Parker type and glass syringes, surgical instruments can be manufactured in *Australia.* It is difficult at present to assess the productive capacity of the surgical instruments industry in Australia. It is anticipated, however, that if orders are received production can be accelerated rapidly and sufficiently for export.

In general, it may be said that fine cutting and other delicate instruments are not yet produced in *India* either in quantity sufficient for her needs or of a quality that attains the standard required. The greater part of the requirements for coarse instruments and appliances under this head are still imported from abroad but the number of those produced in India has been steadily increasing in recent years. There is no dearth of mild steel in the quantities required for the manufacture of these instruments, but high grade steel has still to be imported. Of the instrument factories in India there are only about six, which can be considered as reliable in quality of output and able to increase production substantially. The potential capacity of India in the manufacture of instruments, is far greater than existing output. Certain varieties of coarse needles are made in India from imported steel, but all the finer varieties have to be imported. The actual manufacture of needles does not appear to present insuperable difficulties but the steel wire and tubing required will have still to be imported.

Palestine is producing some simple surgical instruments but in the main, these continue to be largely imported from abroad.

Ceylon, East Africa, Malaya, The Netherlands East Indies, New Zealand and *Southern Rhodesia* are not producers of surgical instruments.

8. PART VI

APPLIANCES

Australia, Ceylon, East Africa, Malaya, The Netherlands East Indies and New Zealand are unable to produce any thing under this heading.

India, generally speaking, produces no optical appliances. There are no factories which manufacture the specialised lenses. Microscopes are not made although the actual stand can probably be made in India without great difficulty. The problem is the lens; all have to be imported and it seems that this course will have to continue. The army requirements of artificial limbs in India are at present met by local manufacture in several centres. Materials are wood and leather, metal portions, steel joints, springs etc., of which all but the first two are at present imported. All the army and civil requirements of India for ordinary wooden and metal splints are made in India although certain materials such as aluminium are imported. Complicated fracture apparatus such as Bohler which were hitherto imported are now being made in India to a small extent. The output of these could be considerably increased but at present it is difficult to say if any exportable surplus will be available. Gas cylinders are not made in India at present. Only a few items of laboratory equipment are made in India and these only on a small scale. Chemical balances sensitive to one milligramme, tin lined copper stills for the preparation of distilled water, primus stoves and wooden articles such as funnel stands and burette stands are made in India but not yet in sufficient amount for all India's needs. Appliances such as polarimeters and autoclaves are not yet made in India.

The production of optical appliances has been started on a small scale in *Palestine* and could be extended if the need arose. Small production for splints and for laboratory requirements also exists.

9. PART VII

X-RAY AND OTHER ELECTRO-MEDICAL EQUIPMENT

Several companies in Australia manufacture X-ray equipment but not in excess of her war time requirements. Production of items under this head depends upon maintenance of supplies of essential components which must be imported. All the *other countries* import their requirements under this head.

10. PART VIII

DENTAL EQUIPMENT

Dental chairs and most dental instruments are made in *Australia*. Manufacturers are working, however, at great pressure to meet local demands. Certain dental materials are available for export in limited quantities. A small amount of surgical equipment such as dental forceps, some of the mechanical equipment and certain items of dental furniture are at present made in *India*. There is no exportable surplus under this heading.

Artificial teeth are manufactured in *Palestine* and a surplus is available for export. Exports in 1939 amounted to £25,000/- . Production can be readily increased to meet demands. Dental cutters of various types and dental instruments are manufactured and a surplus can be made available for export.

11. PART IX

RUBBER ARTICLES

It is reported that surgical rubber goods are manufactured in *Australia* but the production is in its infancy and some little time must elapse before an exportable surplus becomes available.

All the requirements of the Indian Government for hot water bottles, water-proof sheeting, jaconet, and post-mortem gloves are manufactured in *India* but as yet there is no exportable surplus. Experiments are also being conducted in the manufacture of other surgical rubber goods.

The *other countries* do not produce any item under this heading.

12. PART X

GLASSWARE

Bottles unstoppered green or amber round, narrow or wide mouthed, of various sizes have been made in *India* for some years. The output is sufficient for India's requirements but there is as yet no exportable surplus. Some firms are experimenting on the manufacture of stoppered bottles but the fit of the stopper is not yet satisfactory. One firm has a small output of laboratory glassware such as measuring cylinders, burettes, pipettes, petridishes, beakers, glass tubing and flasks. This Firm is also making clinical thermometers but the necessary capillary glass tubing has to be imported from America.

The *other countries* do not produce any items under this heading.

13. *Recommendations:* From the foregoing survey two points emerge which define the nature of the Medical Stores problem facing the Eastern Group of Territories. The first is that throughout the war period reliance must continue to be placed in a preponderating degree on exports from outside the Group. The second point is that despite the generally adverse supply picture there is a limited range of useful surpluses within the Group that can be exploited and developed for mutual benefit.

To take the latter point first, no comprehensive planning can be undertaken until considerably more accurate details are available of what these surpluses amount to and arrangements for a collection of accurate figures are indicated.

The first point concerning the large deficiency during the war period raises a problem which will not apply in a similar degree to most of the other categories of war supplies. It is whether in view of the relatively large deficiencies over the majority of items, some form of centralised purchasing allied with direct detailed distribution from non-Group sources may not have advantages in respect of economy in prices, priority in procurement and systemized planning for manufacture by overseas suppliers. The Sub-Committee remit this suggestion for examination and consideration by the higher authorities of the Conference. Any such scheme would require full and accurate data of the requirements of all Territories of the Group, details of which are not before this Sub-Committee.

STATISTICS OF ESSENTIAL DRUGS

Concerning the Eastern Group countries as submitted by delegates.

Serial No.	Items chosen by the Sub-Committee for investigation	Exportable surplus of manufactured drugs available from Australia.	Exportable surplus of manufactured drugs available from India.	Items of manufactured drugs for which South Africa is self-supporting.
	(a) ESSENTIAL DRUGS (122) (*Organic and Inorganic*)			
1.	Acetonm		..	
2.	Acidum Aceticum Glaciale ..			
3.	,, Acetylsalicylicum			
4.	,, Ascorbic			
5.	,, Boricum	..		
6.	,, Citric and Citrates	..		
7.	,, Hydrochloricum	Yes		
8.	,, Hydrocyanic			
9.	,, Nitric			
10.	,, Salicylicum			
11.	,, Sulphuricum	Yes		
12.	,, Tannicum	..		
13.	,, Tartaric and Tartrates	..		
14.	Acriflavina			
15.	Adeps Lanae	Yes		

Concerning the Eastern Group countries as submitted by delegates

Serial No.	Items chosen by the Sub-Committee for investigation	Exportable surplus of manufactured drugs available from Australia.	Exportable surplus of manufactured drugs available from India.	Items of manufactured drugs for which South Africa is self-supporting.
16.	Adrenalinas Hydrochloridum	..		
17.	Aether Anaestheticus	Yes		
18.	Aethylis Chloridum	Yes	..	..
19.	Aloe	..	Yes	..
20.	Aluman	Yes	Yes	Yes
21.	Ammonii Carbonas	..		
22.	Ammonii Chloridum	..		
23.	Amylis Nitris	Yes	..	
24.	Amylocaine Hydrochloridum and Percaine	..		
25.	Argenti Nitras	Yes	Yes	
26.	Arseni Trioxidum	..		
27.	Apomorphinae Hydrochloridum	..		
28.	Argentoproteinum	Yes		
29.	Atropina		..	..
30.	Barbitonum Solubile		..	..
31.	Belladonna		Yes	Yes
32.	Bismuthi Carbonas			
33.	Caffeina			
34.	Calcii Chloridum			
35.	Calcii Lactas			
36.	Camphora			
37.	Carbonei Tetrachloridum			
38.	Chloral Hydras			
39.	Chloroformum			
40.	Chlorosol (Dettol)			
41.	Chrysarobinum	..		
42.	Cocainae Hydrochloridum	..		
43.	Collodium Flexile	Yes		
44.	Coramine			
45.	Creosotum	..		
46.	Cresol and Lysol	Yes		
47.	Cupri Sulphas			
48.	Dextrosum			
49.	Digitalis			
50.	Emetine Hydrochloridum			
51.	Ephedrine Hydrochloridum			
52.	Ergota Praeparata			
53.	Ferri Sulphas			
54.	Fluorescein			
55.	Hexamina			
56.	Hexobarbitonum Solubile (Evipan Sodium)			
57.	Homatropinae Hydrobromidum			

Concerning the Eastern Group countries as submitted by delegates

Serial No.	Items chosen by the Sub-Committee for investigation	Exportable surplus of manufactured drugs available from Australia.	Exportable surplus of manufactured drugs available from India.	Items of manufactured drugs for which South Africa is self-supporting.
58.	Hydrargyrum			
59.	Hyoscinae Hydrobromidum			
60.	Insulinum			
61.	Iodoformum			
62.	Iodum			
63.	Ipecacuanha			
64.	Jalapa			
65.	Kaolinum	Yes	Yes	Yes
66.	Liquor Formaldehydi	..	..	..
67.	,, Hydrogenii Peroxidi	..	..	Yes
68.	Magnesii Carbonas (Ponderosus)	Yes		
69.	Magnesii Sulphas	Yes		
70.	Menthol			
71.	Mepacrine Hydrochloride and Mepacrine Methane Sulphonate (Atebrin and Atebrin Musonate)			
72.	Mersalyl			
73.	Morphinae Hydrochloridum			
74.	Neoarsphenamina			
75.	Nitrogen Monoxide	..	..	
76.	Oleum Arachis	..	Yes	
77.	,, Eucalypti	Yes	Yes	
78.	,, Hydnocarpi			
79.	,, Menthae Piperitae			
80.	,, Morrhuae or Substitute			
81.	,, Ricini		Yes	
82.	,, Terebinthinae		Yes	
83.	Opium		Yes	
84.	Pamaquine (Plasmoquine)			
85.	Paraffinum Liquidum			
86.	,, Molle (Flavum)			
87.	Paris Green			
88.	Phenacetinum			
89.	Phenobarbitonum Solubile			
90.	Phenol	Yes		
91.	Physostigminae Salicylas	..		
92.	Pituitary Extract (Posterior Lobe)			
93.	Plumbi Acetas		Yes	
94.	Podophylli Resina		Yes	
95.	Potassii Acetas			
96.	,, Bromidum			
97.	,, Chloras			
98.	,, Iodidum			
99.	,, Permanganas			

Serial No.	Items chosen by the Sub-Committee for investigation	Exportable surplus of manufactured drugs available from Australia.	Exportable surplus of manufactured drugs available from India.	Items of manufactured drugs for which South Africa is self-supporting.
100.	Procaine Hydrochloridum			
101.	Pyrethrum			
102.	Quininae Dihydrochloridum			
103.	,, Sulphas			
104.	Resorcin			
105.	Rheum (Rhubarb)		Yes	
106.	Santoninum		Yes	
107.	Senegae Radix			
108.	Scilla		Yes	
109.	Senna		Yes	
110.	Sodii Bicarbonas	Yes	..	Yes
111.	,, Phosphas Acidum	..		..
112.	,, Salicylas	..		..
113.	Strophanthin			
114.	Strychninae Hydrochloridum		Yes	
115.	Sulpharsphenamina			
116.	Sulphonamide preparations (e.g., Sulphanilamide, Soluseptasine, M & B 693, etc.)			
117.	Thymol			
118.	Thyroideum			
119.	Ureastibamine			
120.	Uroselectan B.		..	
121.	Zinci Oxidum		Yes	
122.	Zinci Sulphas,		Yes	
	(b) Biological preparations Sera, Vaccines. Organo-metallic			
	(c) Laboratory Chemicals, Stains and Media,			

Statement A.

APPENDIX VII

Reserve Base Depot Medical Stores

Provisional War Establishments

Detail	PERSONNEL								Remarks
	British			Indian					
				Combatants	Non-combatants (enrolled)				
	Officers	Warrant Officers	Total	Warrant Officers	Skilled	Workmen	Followers	Temporary Personnel	
1	2	3	4	5	6	7	8	9	10
			(i) Summary						
Total Depot	2	2	4	1	66	80	14	4	
			Composition in detail (ii) Personnel						
RAMC or IMS Commanding Officer (Lt.-Col. or Major)	1	..	1	..	..	..	..	..	
2nd-in-Command (Captain) IMD	1	..	1	..	..	..	..	..	
Senior assistant surgeon (manager)	..	1	1	..	..	..	..	..	
Assistant surgeon (assistant manager)	..	1	1	..	..	..	..	..	
Sub-assistant surgeon (i/c stores establishment)	..	..	..	1	..	..	..	..	

APPENDIX VII—(*Contd.*)

Detail	PERSONNEL								Remarks
	British			Indian					
				Combatants	Non-combatants (enrolled)				
	Officers	Warrant Officers	Total	Warrant Officers	Skilled	Workmen	Followers	Temporary Personnel	
1	2	3	4	5	6	7	8	9	10
				Composition in detail. (ii) *Personnel*					
Office Establishment									
Superintendents	..	..	..	..	1	..	..	..	
Assistant superintendents ..	..	..	..	..	1	..	..	..	
Clerks	..	..	..	..	9	..	..	..	
Head messengers (daftris) ..	..	..	..	..	..	..	2	..	
Messengers (peons) ..	..	..	..	..	..	..	2	..	
Stores Establishments									
Superintendents	..	..	..	..	1	..	..	..	
Assistant Superintendents ..	..	..	..	..	4	..	..	..	
Assistants	..	..	..	..	11	..	..	..	
Clerks	..	..	..	..	18	..	..	..	
Compounders	..	..	..	..	14	..	..	..	
Cutlers	..	..	..	..	2	..	..	..	
Tin & Coppersmiths ..	..	..	..	..	2	..	..	..	
Carpenters	..	..	..	..	3(a)	79	..	..	(a) packers.
Markmen	..	..	..	..	..	..	2	..	

APPENDIX VII—(*Contd.*)

Detail	PERSONNEL								Remarks
	British			Indian					
				Comba-tants	Non-combatants (enrolled)				
	Officers	Warrant Officers	Total	Warrant Officers	Skilled	Workmen	Followers	Temporary Personnel	
1	2	3	4	5	6	7	8	9	10
Blacksmith	..	..	..	..	..	1	..	..	
Bellowsboys	..	..	..	..	..	..	2	..	
Stillman	..	..	..	..	..	..	1	..	
Watercarriers	..	..	..	..	..	..	1	..	
Sweepers	..	..	..	..	..	..	2	..	
Watchmen	..	..	..	..	..	..	2	..	
Servants for officers ..	..	..	..	..	..	..	..	2	
Servants for IMD ..	..	..	..	..	..	..	..	2	
Total Depot	2	2	4	1	66	80	14	4	
Attached Foot constables (b) ..	..	..	..	..	..	(b)2	..	..	(b) provided by Police Dept.
Total Depot (including attached)	2	2	4	1	66	82	14	4	

APPENDIX VII—(*Contd.*)

Statement B

Table Showing Extra Establishment Authorised at the Medical Store Depot, Lahore Cantonment, on its becoming the Reserve Base Depot, Medical Stores

	Present authorised peace establishment of M.S.D. Lahore	Addl. Estab. sanctioned vide A.D. No. 29798/8 (D.M.S. 2) dated 12-1-35	Total Estab. of No. I.R. B.D. M.S. on Mobn.
Officer-in-Charge	1	..	1
Captain	..	1	1
Senior Asstt. Surgeon, I.M.D. ..	1	..	1
Asstt. Surgeon, I.M.D.	..	1	1
Sub-Asstt. Surgeon, I.M.D. ..	1	..	1
Superintendents	2	..	2
Asstt. Superintendents	5	..	5
Stores Assistants	10	1	11
Clerks	17	10	27
Compounders	11	3	14
Cutlers	2	..	2
Tinsmith	1	1	2
Carpenters	2	1	3
Markmen	1	1	2
Packers	59	20	79
Bellowmen	1	1	2
Stillman	1	..	1
Dammerman	..	1	1
Daftris	2	..	2
Peons	2	..	2
Bhistis	1	..	1
Sweepers	2	..	2
Chowkidars	4	..	4

APPENDIX VIII

Memoranda (October, 1939) by Colonel, Sir R. N. Chopra, Director, Biochemical Standardisation Laboratory, Calcutta indicating position of Drug Supply to the People of India at the Commencement of World War II, including position of Coal Tar Products, Requirements of Drug Manufacturers in India and Difficulties met with in procuring them

The outbreak of war and the difficulties of getting regular supplies of drugs and essential medicinal chemicals have profoundly affected the drug market in India. This was natural as India was largely an importing country in the matter of her drug supplies. The following table collected from the data contained in the sea-borne trade statistics of British India will indicate that more than two crores worth of medicinal preparations and allied products are imported annually into India.

Import of Medicinal Drugs and Chemicals

	1933–34	1934–35	1935–36	1936–37
1. *Medicinal Drugs*				
*(i) Pharmacopoeial & otherwise	1,62,44,519	1,52,63,886	1,46,95,869	1,39,00,025
(ii) Proprietary Medicines	30,97,635	39,26,150	64,20,669	67,95,484
(iii) Alcohol used in medicines	33,82,330	36,51,007	38,34,246	37,95,967
**(iv) Essential oils ..	10,83,384	12,58,893	15,43,273	14,43,469
Total ..	2,38,07,868	2,40,99,936	2,64,94,057	2,59,34,954
2. Total Chemicals excluding manures and medicines	2,76,92,543	2,99,98,692	3,19,21,625	2,79,12,155

*(i) Pharmacopoeial drugs include Aloes, Asafoetida, Camphor, Cocaine, Quinine salts, Saccharin etc.

**(iv) Essential oils include synthetic essential oils and natural oils like oils of clove, cajuputi, and others.

2. Total chemicals include acids, bleaching materials, glycerine, lead compounds, potassium and sodium compounds, fine chemicals etc.

While a large proportion of the drug imports come from Great Britain, Germany's trade with India in medicinal preparations (particularly synthetic drugs) and certain basic chemicals necessary for drug manufacture was not of insignificant proportions. As these have been completely cut off, it is important now to see how these could be replaced

(i) by manufacture in this country, and where this is not possible at present, (ii) by imports from the United Kingdom or other neutral countries. So far as the possibility of manufacture of India's drug requirements in India is concerned, it may be stated that this country is now in a very much better position than it was in 1914. Indigenous drug industry has *progressed considerably* since then and is now in a position to supply a large number of commonly used drugs and other medical supplies. It is to be greatly regretted that for many essential basic chemicals, solvents, synthetic remedies, etc., India is still hopelessly dependent on supplies *from abroad.* The sooner this state of affairs is remedied the better. it will be for everybody concerned.

A REVIEW OF INDIA'S POSITION WITH REGARD TO DRUG SUPPLY

A. *Drugs of vegetable origin and essential oils*

So far as the drugs of vegetable origin are concerned, India is fortunately in a much better position than many other countries, including Great Britain. India has a wonderful range of materia medica and nearly three-fourths of the drugs mentioned in the British and other pharmacopoeias grow here in a state of nature or have been cultivated. Where the pharmacopoeial species do not grow, allied species are available which may be used as substitutes. If our resources are properly husbanded and conserved, India *would not only* be completely self-supporting in this respect but may also be in a position to supply Great Britain all the raw products that will be needed in the preparations of pharmaceutical products. At present, Great Britain draws a fairly large supply of crude drugs from mid-Europe, particularly from areas which are now under the German influence. These will presumably be cut off to a large extent and Indian sources may be of use in meeting such deficiencies as might occur.

With regard to essential oils, India has the *basic materials* from which Ajowan, Caraway, Chenopodium, Cinnamon, Coriander, Cardamom, Rose, Sandal Wood, Turpentine, etc., can be produced but she has to import others chiefly from Central European countries. Essential oils have not hitherto been distilled in large quantities and on proper scientific lines in India, but there is no doubt that this industry can be easily and successfully developed in a very short time.

B. *Fixed Oils*

Almost all the fixed oils used in medicine such as almond oil, arachis oil, castor oil, hydnocarpus oil and oils of linseed and sesame are available in India. Olive oil may be easily replaced by Arachis oil. Purified medicinal castor oil is now imported as cold drawn oil and is seldom manufactured in India, though ordinary oil used in hospitals and dispensaries is manufactured in this country. There could be no difficulty in preparing the purified oil used in medicine in sufficient quantities for the need of India and Great Britain.

C. *Alkaloids and Fine Chemicals*

Of those commonly employed in therapeutics, India can produce atropine and its salts, caffeine and its derivatives, emetine, ephedrine, morphine, codeine, quinine, strychnine, santonin, podophyllum resin, etc. Strychnine is already being manufactured by Messrs. Smith Stanistreet & Co., in large quantities and is exported to Australia. Caffeine can be manufactured if tea fluff (dust) is made available to the bona fide drug manufacturers by the Indian Tea Association at a reasonable price. Morphine and its derivatives including codeine can be produced at the Ghazipur Opium Factory. Artemesias grow in the Kurrum valley and santonin is manufactured in Kashmere on a large scale and is exported to different parts of the world. Ephedra and belladonna are available in fairly large quantities and ephedrine and atropine can be produced in almost any quantity. Some of these industries could not develop during peace time owing to keen foreign competition and high prices of the solvents used. It is now time to develop this industry.

For quinine, India as the rest of the world will have to depend on the Dutch East Indies for some time to come. India produces a limited quantity of cinchona alkaloids. Between the two plantations at Mungpoo (Sikkim Himalaya) and Nadavatrum (Nilgiris) roughly between 65,000 to 70,000 pounds of cinchona alkaloids are produced every year. The total requirements of India at the present time are over 200,000 pounds so that over 100,000 pounds at least has to be imported from the Dutch East Indies. I have on many occasions urged the extension of India plantations, but cinchona plantations take seven to eight years to mature so that for the present emergency India will have to depend on the Dutch East Indies for its supply of cinchona alkaloids. There could be no great difficulty at present to ensure this supply as this zone is free from war risks.

It may be mentioned in this connection that soon after the Report of the Drugs Enquiry Committee was submitted to the Government of India, I received a letter from Kina Bureau at Amsterdam, which controls the manufacture of cinchona alkaloids in the Dutch East Indies, informing me that the Bureau could supply quinine at a very nearly half the price current in the market if the Government of India or the Provincial Governments wanted quinine for their own use. This correspondence was forwarded to the Department of Education, Health and Lands and to General Sir John Megaw who was the Director General at that time (1931). It may be in the office records and it may be worth while opening this question with Kina Bureau now.

Ipecacuanha has also been grown in Mungpoo but the supply is very small and not commensurate with the demands. The plantation may be encouraged and in the meantime the supply may be procured from the Federated Malaya States where it grows extremely well.

D. *Inorganic Drugs*

The important inorganic drugs used in medical practice are:—boric acid, hypophosphorus acid, salts of ammonium (chloride carbonate), potassium iodide, bromide, chlorate, citrate, permanganate, sodium (benzoate, bromide, bicarbonate, citrate, tartarate, iodide, phosphate, salicylate), magnesium (carbonate, oxide, sulphate). For almost all of these, India will have to depend on foreign supplies for some time to come. Apart from alkalies and acids, the most important items required are iodine, and bromine. So far as iodine is concerned there is the possibility of securing it from Japan. If Great Britain revives the Scottish Kelp Industry during the war emergency, there is also the possibility of getting at least a partial supply from this source. Bromine will be more difficult and Government will have to devise special measures to secure it. Some of the above named inorganic drugs are already being manufactured in India but their manufacture entirely depends upon the supply of certain essential basic chemicals and solvents from abroad. Every effort should be made to encourage the production of the basic material in the country, but in the meantime the supplies should be ensured from neutral countries.

E. *Special Organic Drugs*

Practically without exception all of these have to be imported. The chief source of many of these, such as acetone, acetin acid, acetylsalicylic acid, benzol, benzoic acid, citric acid and lactic acid, oleic, tartaric, trichloroacetic acids, ether, ethyl chloride, chloral hydrate, chloroform, hexamine, glycerine, emyl nitrate, urea, lactose, was Germany, though some of these were also obtained from the United Kingdom and the United States of America. Some of these have been and can be manufactured in India under emergency conditions provided steps are taken to supply basic chemicals and solvents.

F. *Metals and Organo-metallic Compounds*

For all preparations belonging to this category, such as gold salts, silver compounds, inorganic preparations of mercury (mercurous and mercuric chloride, mercuric iodide), inorganic arsenicals (arsenic triiodide and trioxide), inorganic bismuth compounds (bismuth carbonate and salicylate) and lead compounds (lead subacetate) India is entirely dependent on foreign supplies at the present time. Many of these compounds could easily be manufactured. Copper salts (sulphate) can be prepared from Indian copper, Zinc, antimony, lead, may be available from Burma and utilised.

Organo-metallic compounds of gold (solganol, sanocrysin, etc.), silver (argyrol, protargol, etc.), mercury (novasurol, salyrgan, mercurochrome etc.) arsenic (neoarsphenamine, sulpharsphenamin, stovarsol, carbarsone, tryparsamide, etc.), antimony (urea stibamine group, neostibosan group, stibamine glucoside, etc.), bismuth (trepol, bismutol, bistoval, etc.) are all imported at present. Organic compounds of arsenic, antimony and bismuth have been successfully prepared in India and if research is properly organised most of the above manufactured compounds could be prepared in the country. Reserve stocks held in India may be sufficient for the needs of the immediate future but in case of prolonged war it is the duty of the Government to ensure supplies for the population of the country and this can only be done by encouraging local manufacture.

G. *Glandular Products including Liver Extracts*

There should not be any great difficulty for the supply of these products from the U.S.A. but many of these can be manufactured in India provided the slaughter-houses are run properly and the dissection and separation of flesh glands are done under expert supervision. The question of solvents, is also of prime importance in this connection. Some of the manufacturing houses in Calcutta claim that they can produce thyroid, adrenel and posterior pipuitary preparations. Some of these have been tested in the Biochemical Standardisation Laboratory and have given satisfactory results. There is little doubt, however, that quite a large proportion of India's requirements in these glandular preparations and of products such as testicular and ovarian preparations, insulin, corpus luteum preparations, etc., are obtained from abroad. Within the last few years; sex gland preparations are being produced synthetically and are in large demand in the treatment of female disorders. Their therapeutic uses are still largely experimental and even if they are cut off, not much difficulty is likely to be experienced. Liver extracts both for oral use and injectable forms can be and are actually being prepared in India.

H. *Vitamin Preparations, Patent Foods and Irradiated Milk Foods and Cereal Products*

Vitamin preparations have now established themselves in therapeutics and are being prescribed by a large number of practitioners. Pure vitamin preparations which are largely of synthetic origin are imported and will be difficult to get during the war time. The want of these preparations can be largely met by giving natural vitamin-rich foods in suitable quantities.

Cod liver oil is an important imported product and will probably be largely withdrawn due to shipping difficulties. I have no doubt that it can be replaced by fish liver oils of India if a little more research is carried out in this direction.

Some patent foods and irradiated milk foods are very important accessories to medical treatment. These are all imported but fortunately a large quantity of these are obtained from Great Britain and, therefore, at least a partial supply will be possible.

I. *Biological Products*

Prophylactic and curative sera of all types are being manufactured in India. If the quality of these is controlled by proper standardisation, this source will be sufficient to meet all the Indian demands. For this International Standards (toxins, antigens, antitoxins, etc.) should be regularly supplied to the manufacturers.

A very important requirement in this industry is the supply of filter pads and filter candles which were imported from Germany. These have to be secured, neutral ampoule glass is also necessary.

Vaccines of all types can also be manufactured.

J. *Surgical Dressings, Disinfecting Fluids etc.*

Absorbent cotton, gauze, jute, lint, bandages, etc., are being manufactured and no difficulty need be apprehended.

Disinfecting fluids of the type of phenol, crosol, etc., are being prepared in very small quantities from coal tar distillation but their manufacture can be quickly extended. (*See special note attached*).

Sd/–R. N. Chopra, M.D., F.R.C.P., 14–10–1939
Director, Biochemical Standardisation Laboratory,
All India Institute of Hygiene and Public
Health, Calcutta.

SPECIAL NOTE

Position of Central Tar Products in India

Till recent years no distillation of Coal Tar was carried out in India. Gradually the demand for Tar for purposes of dressing roads increased and with this, the industry has assumed greater importance. Firms such as Bengal Chemical and Pharmaceutical Works, Turner Morrison and Co. and others distilled Coal Tar on a very small scale, but with the realization by the P.W.D. and other public bodies that the Road Tar is as efficacious for road dressing purposes as the imported Asphalt, these firms started operations on a larger scale. The demand for road tar has thus steadily increased and in the near future it will be possible to get sufficient quantities of the bye-products of coal-tar distillation. At present though the quantity of tar distilled is small, some of the firms have taken up the recovery of the bye-products and utilise them for the preparation of pharmaceutical chemicals.

The yearly consumption of Coal Tar by Bengal Chemical & Pharmaceutical Works is about 6,000 tons and Turner Morrison & Co. use about ten times as much. Recently, Barakee Coke Ovens (Jardine Skinner & Co. Ltd.) have started the recovery of some of the bye-products from their Coke-oven plants.

The following bye-products are at present recovered from the distillates mainly by Bengal Chemical and Pharmaceutical Works. The percentage of these products in Coal Tar being small, future possibilities for some of these products will depend upon the increased demand of road tar.

[1] Bye-products recovered by Bengal Chemical and Pharmaceutical Works per month:

1.	Benzol (purified)	15 galls.
2.	Toluol (purified)	20 ,,
3.	Benzol Coml. (solvent)	30 ,,
4.	Pyridine Coml.	80 ,,
5.	Acid Cresylic B.P.	200 ,,
6.	Carbolic acid crude	15 ,,
7.	Naphthalene balls	10 tons

The bye-products recovered by Barakee Coke Ovens Co., are as follows. The quantities produced are not known.

1. Benzol pure, 2. Benzol commercial (motor spirit), 3. toluene pure, 4. benzol commercial (solvent), 5. Naphthalene crude.

As far as is known, Turner Morrison & Co., do not recover any of the above bye-products, except crude naphthalene.

Coal tar distillation industry is still in its infancy, as the quantity of coal tar distilled in India is insignificant in comparison with the quantity of tar distilled in the European countries. Unless the demand of road tar is enormously increased by substitution of road tar for the imported products which are much more expensive, this industry cannot flourish. If the Government and the public bodies take up the matter in hand the basic industry for the manufacture of coal tar products may be considerably extended in India, with immense future possibilities.

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[1] These are recovered only from gas tar. About 1000 tons of this tar is used by Bengal Chemical yearly.

Sd./–R.N. Chopra, Col., C.I.E., I.M.S. (R)
Director, Biochemical Standardisation Laboratory,
All India Institute of Hygiene and Public
Health, Calcutta. 14-10-1939.

Requirements of Drug Manufacturers in India and the difficulties in procuring these during the present War.

A review of the various preparations in the British Pharmacopoeia, British Pharmaceutical Codex, Extra Pharmacopoeias, New and Non-official remedies, etc., which include almost all the drugs and medicinal preparations in common use in India excepting of course the medicinal specialities and proprietaries of unknown composition, shows that this country is entirely dependent for the major portion of its drug supply on foreign countries. A critical analysis of the situation convinces me that *the chief difficulty is that India does not possess facilities for manufacturing certain essential basic materials* such for example as alkalies, acids, solvents, phenol, aniline, bromine, iodine, urea etc., which may be considered as the key-stones for the drug industry. In case of some of these the country lacks the natural resources of the material which are necessary, but in most cases these materials are dependent on the growth of other associated industries which are non-existent. The appended list shows the basic chemicals which are required for the manufacture of medicinal drugs. Wherever possible, Indian sources from which such materials can be secured are indicated along with the sources from which they can be imported from foreign countries.

With the development of the chemotherapeutic drugs in the treatment of many tropical diseases and bacterial infections, the need and use in this country of synthetic remedies has considerably increased during recent years. The basic chemicals in this connection (given in the attached list) are, therefore now, regarded as being of much more importance than they were when drugs mostly of vegetable origin used to be the main weapons in the armamentarium of the physicians.

A detailed note on some of the important items is given in the succeeding paragraphs with a view to explain the position of the Indian drug industry as it is affected by the present war.

Mineral Acids: The supply of sulphuric acid, which is the key substance used in the pharmaceutical industry, depends entirely on foreign sulphur. Italy, America and Japan have uptil now supplied almost all the sulphur required for the manufacture of sulphuric acid in India. Sulphur from Japan contains traces of arsenic and this fact restricts its use in India. The supply of sulphur has been entirely cut off since the outbreak of the war. If for want of sulphur, sulphuric acid manufacture has to be discontinued, chemical industry in India will be seriously affected. If, however, the supply is assured, one of the chief difficulties of the pharmaceutical industry will be solved. Attempts are now being made to utilise the sulphur from the pyrites, an ore containing iron and sulphur, but this attempt has not been successful so far. A mine of pyrites is available in Bihar, the ore from which is said to be free from arsenic. Another source of supply has been discovered near Simla. Attempts are now being made by Bengal Chemical and Pharmaceutical Works to devise special burners in which instead of burning ordinary sulphur, iron pyrites could be utilised in the manufacture of sulphuric acid and it is hoped that success will be obtained.

An idea of the importance of sulphuric acid in the pharmaceutical industry may be obtained from the fact that in the manufacture of the following heavy chemicals, sulphuric acid is an essential requirement:—Epsom salt (magnesium sulphate), Glauber's salt (sodium sulphate), ferrous sulphate, copper sulphate, ammonium sulphate, alum, alumina sulphate, ferro-alum, and besides these, hydrochloric acid and nitric acid with their numerous derivatives.

2. *Alkali and Chlorine:* Alkali manufacture is particularly poorly developed in India. The most important and basic items in this group are: (a) Soda ash and potash, and (b) caustic soda and caustic potash. Almost the entire supply of alkali consumed by India is imported from abroad and manufacture of these products in India is absolutely essential. Attempts are being made in this direction by the Imperial Chemical Industries and the Tata Iron Works but so far no tangible results have been obtained. Along with caustic alkali, chlorine, another fundamental substance of Chemical Industry will be produced. The manufacture of chlorine and caustic soda is so very essential and expensive that it is the duty of the Government to encourage it and help financially if need be by setting up of factories.

3. *Solvents:* With the exception of alcohol, practically no solvent in any large quantities is being manufactured or is available in this country. A great handicap, according to the drug manufacturers, is the enormous duty on alcohol. Unless this duty is reduced, it will also be difficult for the manufacturers of spirituous preparations to compete with the imported preparations in the open market which get the additional privilege of a very much reduced railway freight from the port of entry to the place of their destination in India, and which privilege is denied to the Indian manufacturers. At a time such as this, both these factors should be seriously considered by the Government, if the supply of medicinal drugs is to be ensured to the people of India whose economic condition is low, at prices commensurate with their means.

Benzol or commercial benzone is another solvent which is much in demand. Benzol is now produced in sufficient quantities in India, but the Government of India have imposed an excise duty of -/10/- (annas ten) per gallon on this commodity on the ground that benzol can be used as motor spirit as a substitute for petrol. This fact has prevented such firms as Tata Iron and Steel Works and Bengal Iron and Steel Co. and others, from manufacturing this product in their Coke Oven factories and enormous quantities of benzene are thus going to waste. Such a thing would not be permitted in any other country. If this duty is reduced it will be of enormous advantage to the country in general and to the drug industry in particular.

Ether Petroleum: Though ether (sulphuric) is largely employed as a solvent in the drug industry for defatting purposes, petroleum ether is sometimes preferable and in some cases, galenicals of the B.P. quality cannot be produced without the use of this solvent. The Government should help the drug manufacturing industry by supplying the necessary requirements at a reasonable price. Petroleum refineries in Burma produce a certain amount of this solvent. The production of this solvent could probably be increased during this emergency.

Chloroform: Limited quantities of chloroform have been produced by at least two Indian companies from bleaching powder. These firms have been selling good quality of chloroform even for anaesthetic purposes. But this is stopped due to the fact that bleaching powder is not available now. Even if it is available, it is being sold at a price very much higher than the pre-war price of Rs. 4/8/- to Rs. 4/12/-. Chloroform may be manufactured in fairly large quantities in India, provided bleaching powder is made available.

Organic Acids: Almost all the organic acids are imported from abroad and are converted into different salts used in the pharmaceutical industry.

Citric Acid may be produced in this country from lemons and limes provided the supply of these fruits is properly controlled. During the last war, certain amount of citric acid was actually prepared in India.

It should be possible to make salicylic acid from the oil of wintergreen (*Gaultheria fragrantissima*) which is available in the United Provinces and in north India. This supply, however, will hardly be able to meet the demands of the Indian drug manufacturers.

Benzoic acid: in limited quantities may be produced from gum benzoin which is available in India. The requirement of benzoic acid is not much and, therefore, the supply may be adequate if proper attention is paid in this direction.

Tartaric acid in limited quantities may be prepared from tamarind which are obtained in fairly large quantities in India. During the last war of 1914, it was produced and there is no reason why this cannot be done again. Fairly large quantities are, however, required in the manufacture of biological products and, therefore, part of the supply will have to be obtained from the U.S.A.

It is difficult to see why *phosphoric acid* is not manufactured in India. It can be comparatively easily manufactured from bone ash which should be available in large quantities. In any case, this should be attempted during the emergency period.

Gases and Liquids: Bromine, chlorine and sulphur dioxide are three essential products in this group, all of which have to be imported. Unfortunately the chief source of bromine is Germany and supplies from this source will naturally be cut off. The Government should make every effort to procure this commodity from the U.S.A. or other sources, if possible.

Liquid chlorine cylinders should be procured from England for the Indian manufacturers or a regular and plentiful supply of bleaching powder should be ensured from which chlorine can be easily prepared.

Sulphur dioxide is also an important gas which should be procured from outside. This gas can be made from sulphur but has not been made in India so far.

Common Chemicals

Sugars: (a) Cane sugar (b) glucose and (c) lactose are used in medicine in enormous quantities. Cane sugar is manufactured in India. The manufacture of glucose, which is of such great importance in medicine should be immediately taken up in India. Starch is being already manufactured in small quantities. In this connection, I wish to point out that at least one firm in Calcutta had ordered the machinery for the manufacture of glucose from Germany, which was due to arrive in India before the war and it is understood was taken to Goa or some other neutral port.

Potassium Iodide and Potassium Bromide are two very important chemicals which are in daily use in medical practice. These should have to be procured from abroad as both potassium and iodine or bromine are not obtainable in India.

Potassium permanganate: This has been produced by electrolytic method by the Bengal Chemical and Pharmaceutical Works Ltd. This firm tried to increase their production and ordered for a special motor generator from a London firm, Greaves Cotton and Crompton Parkinson Ltd. Due to the war, the machinery has not been delivered in India. If this is done, the firm will be in a position to supply fairly large quantities.

Potassium dichromate can be easily manufactured in India from chromide ore available in the Singhbhum district. Two Calcutta firms actually produced it but due to foreign competition, this has now been almost completely stopped. This industry can be revived. Potassium dichromate manufacture will not only help the drug industry but will also supply an essential chemical to the tanning industry.

Aniline: Aniline is obtained from benzene, which is nitrated and then reduced. This chemical, in some form or other, is the starting material for some of the best known synthetic drugs such as sulphonamides and its derivatives, anti-malarial drugs such as atebrin and plasmochin, hypnotic drugs such as luminal and veronal, analgesic drugs such as aspirin and veramon, local anaesthetics such as novocaine, etc., antiseptics such as mercurochrome and acriflavine, antimonial preparations such as the neostibosan group and the urea stibamine group of drugs, arsenical preparations such as neosalversan and sulpharsenol. Aniline is produced in large quantities in Germany and was the main source of supply of this country. Small quantities are also being manufactured in England, America and Japan. If the supply of aniline is ensured during the war, many of the synthetic drugs could be manufactured in India. In this connection it may not be out of place to mention that it is possible to manufacture atebrin and plasmochin from aniline. Some of our young chemists have been working at this problem and have been successful. I believe I am not giving away a secret when I say that the chemists at the Haffkine Institute have prepared a compound closely allied to atebrin, if not atebrin itself. The Union Drug Co. of Calcutta are also making efforts in this direction. I feel sure that with a little encouragement from the Government these compounds which are now a necessity in the treatment of malaria could be manufactured in this country. I would reiterate here that the manufacturers of Iron and Steel Works in this country should be made to manufacture benzene and conserve its supplies during the present emergency.

Metals

Antimony, Bismuth, Lead, Tin and Zinc : These metals are essential for the preparation of many useful medicinal drugs. Burma is said to have ores containing all these metals, specially antimony of good enough quantity for the manufacture of medicinal compounds which is so much in demand in this country.

Enquiries should be made with regard to bismuth, lead, zinc and tin from the Burma Government. Tin can also be obtained from the Federated Malaya States.

Mercury mostly comes from Spain but if this source is cut off, China can supply India's requirements.

Arsenic has to be brought from foreign sources. This is essential for the preparation of many chemotherapeutic remedies.

Miscellaneous Requirements

Apart from the requirements detailed above, there are quite a number of very important accessories which are widely used in the drug manufacturing industry. Thus, in the manufacture of sera, vaccines and other biological products, filter papers and filter pads (Seitz pads) are essential. These have to be procured from outside. These are already running short and the Government will have to consider how these can be obtained.

Glass bottles, phials and other containers for the storage and distribution of injectable and other preparations are usually imported. There is apparently no glass factory in India which can produce good quality (neutral) ampoule glass. Japan had been exporting large quantities to India but this supply is not dependable.

Velvet cork for medicine bottles is imported from Spain. As there is no substitute for this in India supplies should be ensured.

Rubber tubes have to be imported either from Great Britain or U.S.A. This is also a very important accessory for the drug industry.

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List of Basic Chemicals necessary for the Manufacture of Drugs.

A. *Acids*

*Acid Acetic Glacial	usually imported from Germany and Japan. Crude acetic acid and acetone in limited quantities available in India. Indian Source:—Bhadrabati Chemical Works, Mysore.
Acid Acetic Anhydride	used in the Synthesis of drugs usually imported from Germany.
*Acid Benzoic	usually imported from U.K., Central Europe and U.S.A. May be manufactured in limited quantities from Gum Benzoin available from Near and Far Eastern countries (Siam, Sumatra, etc.)
Acid chloracetic	used in the Synthesis of drugs. Usually imported from Germany, U.K., U.S.A., etc. May be manufactured in India provided sufficient chlorine and acetic acid are available.
*Acid Citric	usually imported from Italy. May be manufactured in limited quantities in India from Lemon and Lime.
Acid Hydrobromic	used in the Synthesis of atebrin, etc. usually imported from Germany, Japan, U.S.A. May be manufactured in India provided bromine is available.
*Acid Hydrochloric	produced in India in sufficient quantities. But its manufacture is dependent on Sulphuric Acid.
Acid Hydroiodic	usually imported from U.K., U.S.A., Japan. May be manufactured in India if Iodine is available.
*Acid Lactic	usually imported from U.K., Germany, U.S.A. May be manufactured in India in limited quantities from whey of cheese which is washed at present.
*Acid Nitric	produced in sufficient quantities in India. But its manufacture dependent on Sulphuric Acid.
Acid Oxalic *Acid Phosphoric	usually imported from U.K., U.S.A., Germany, Japan. May be manufactured from bone ash, but not attempted.
*Acid Sulphuric	produced in India in sufficient quantities but its manufacture depends on the supply of Sulphur which is imported mainly from Italy, Japan. It can also be manufactured from Pyrites which is available in limited quantities. Manufacturing firms in India are trying to produce the acid from this source.
*Acid Sulphuric (Fuming)	usually imported from Germany. In India, it is manufactured at the Tata Iron Works for their own consumption—also in the Digboi Oil Co. and probably also at Bhadrabati Iron Works at Mysore. They may be approached to increase their output.
*Acid Tartaric	usually imported from Italy, U.K. May be attempted in India from tamarind in limited quantities (used in the manufacture of biological products).

Acid Trichloroacetic	usually imported from Germany, U.S.A. May be manufactured in India if chlorine and acetic acid are available.
*Acid Salicylic	usually imported from Germany, U.K., etc. May be produced in India in limited quantities, from oil of wintergreen.

B. *Alkalies*

*Ammonia Liq.	usually imported in cylinders in liquid from U.K., Germany. Limited quantities available in India from coal-tar distillation.
Barium Hydroxide	used in the manufacture of certain drugs and pharmaceuticals. Usually imported from U.K., Germany, America.
Calcium Carbonate Pure (Precipitated)	usually imported from U.K., Germany, U.S.A.
Lime (Pure)	usually imported from U.K., Germany, U.S.A.
Potassium Hydroxide	imported mainly from Germany. Imperial Chemical Industries may be asked to supply this item.
Potassium Carbonate	imported from Germany. Imperial Chemical Industries may be asked to supply this item. May be manufactured in India by reduction of saltpetre.
Potassium Cyanide	imported from Germany, U.K., U.S.A.
Sodium Hydroxide	usually imported. May be obtained from Imperial Chemical Industries.
Sodium Carbonate	usually imported through Imperial Chemical Industries.
Sodium Bicarbonate	usually imported through Imperial Chemical Industries.

C. *Solvents*

Amyl alcohol	imported from Germany, U.S.A. May be prepared in limited quantities in India in alcohol factories.
*Acetone	generally imported from Germany, U.S.A. Commercial acetone in limited quantities available from Bhadrabati Chemical Works, Mysore and at the Government Cordite Factory, Nasik.
*Benzene	generally imported from U.K. and U.S.A. Commercial Benzene can be obtained in sufficient quantities from Burmah Oil Company and other petroleum refineries.
Carbon Disulphide	from Germany and U.K.
Carbon Tetrachloride	from Germany.
*Chloroform	imported from Germany, U.K., U.S.A. Manufacturing in India is dependent on the supply of bleaching powder or liquid chlorine available from Japan.
*Ether Sulphuric	from Germany, U.K., U.S.A. Available in India in sufficient quantities but dependent upon sulphuric acid.

*Ether Petroleum (Light)	from U.S.A., U.K. May be obtained in India from the petroleum refineries.

D. *Gases and Liquid*

Bromine	useful for Synthesis of drugs. From Germany, Japan, U.S.A.
*Carbon Dioxide	easily available in India, from breweries, etc.
Chlorine	Liquid Chlorine imported from Germany, U.K. Bleaching powder, which is also another source of chlorine, is imported in large quantities.
*Hydrogen	available in India in sufficient quantities.
*Nitrogen..	available in sufficient quantities.
*Oxygen ..	available in India.

E. *Common Chemicals*

Agar-Agar	very important. May be secured from America, Japan, etc.
Aluminium chloride (dry)	required in synthetic processes. Available from U.K., U.S.A.
Aniline ..	very important for synthetic purposes, usually imported from Germany, U.K., etc.
Antimony	available in Burma. Napier Paint Works are the agents in India.
Arsenic Trioxide	mainly from Germany. Source of Arsenic compounds (Organic).
Bismuth carbonate and sub-nitrate	mainly from Germany. May be secured from Burma.
Camphor	natural source from Japan, synthetic from Germany.
*Cresols ..	from U.K. Partly manufactured in India by B.P.C.W.
Formalin	from U.K. May be produced from methyl alcohol.
*Gelatin ..	from Italy, France. Commercial gelatin may be prepared in India.
Glucose powder (for injection purpose)	world supply from Corn Products, America.
*Glycerine ..	from U.K. & Germany. Limited supply from 'Tomco' and 'Lever' Bros. (Bombay).
Iodine ..	from Japan.
Lactose ..	from Germany, U.S.A. May be prepared partly in India from white cheese whey.
Lead ..	from Burma.
Lead acetate	from U.K., U.S.A., Germany etc. May be prepared provided lead and acetic acid available.
Mercury	from Spain, China.
Pamino acetanilide	from Germany. For synthesis of drugs.
*Paraffin (Liquid)	from U.S.A. Limited quantity from Burmah Shell and Co.
Phenol ..	from U.K., Germany. Very limited quantity of crude phenol available from B.P.C.W. and Ladco.

Phosphorus Oxychloride	from Germany, U.K.
,, Trichloride	from Germany, U.K.
Pentachloride	from Germany, U.K.
Pentoxide	from Germany, U.K.
Potassium Dichromate	from Germany. May be made in India from chromide ore. (Singhbhum).
Potassium Permanganate	from Germany. May be produced in India (B.P. C.W.). Experiments already successfully performed. Depends on caustic potash lye.
Potassium Iodide	from Japan.
Potassium Bromide	from Germany.
Pyridine	from Germany and U.K. Limited quantities made by B.P.C.W. from coal-tar distillation.
Sodium Citrate	from Germany, Italy, U.K.
Sodium Nitrite	from Germany, U.K.
*Starch	from U.S.A. May be produced in India-Punjab, Bombay and Burma.
Sulphur	from Italy, Java, U.S.A., Japan. Attempts are being made to get sulphur from pyrites ore which contains about 45 per cent sulphur.
Tin	from Burma.
Urea	from Germany.

F. *Miscellaneous Requirements of Drugs Manufacture*

Filter Papers	from Germany, U.S.A.
Filter pads (Seitiz filters)	essential for sera and vaccine production.
Filter Candles	essential for sera and vaccine production.
Rubber Tubes and Corks	may be procured from U.K. & U.S.A.
Velvet cork	from Spain and Portugal.
Glass goods of all kinds required for manufacturing purposes (neutral glass ampoules etc.)	from Germany, U.S.A. and U.K.

Sd./- R. N. Chopra, M. D., 14-10-1939.

ANNEXURES

List. A(1). Essential Drugs and Medicinal Chemicals available in India.
A(2). Essential Drugs and Medicinal Chemicals which may be manufactured in India under emergency conditions.
A(3). Essential Drugs and Medicinal Chemicals whose substitutes are available in India.
A(4). Essential Drugs and Medicinal Chemicals whose substitutes are available in India.
B(1). Drugs and Medicinal Chemicals of secondary importance available in India.
B(2). Drugs and Medicinal Chemicals of secondary importance which may be manufactured in India under emergency conditions.
B(3). Drugs and Medicinal Chemicals of secondary importance which are to be obtained from neutral countries.
B(4). Drugs and Medicinal Chemicals of secondary importance whose substitutes are available in India.

LIST A(1)

Essential Drugs and Medicinal Chemicals available in India

Acetic Acid (B.P.) available in India only in very limited quantity.
Acetone (B.P.) Crude acetone available in limited quantity.
Alcohol (BP).
Alum (B.P.) Depends on sulphuric acid.
Ammonia (B.P.) Available in limited quantities.
Belladonna and preparations (B.P.) *Atropa belladonna.*
Caffeine (B.P.) *Camellia thea.*
Carbon dioxide (B.P.)
Castor Oil (B.P.) *Recinus communis.*
Chlorinated soda (B.P.)
Digitalis and Preparations (B.P.) *Digitalis purpurea.*
Ephedrine hydrochloride (B.P.) from *Ephedra vulgaris* and other species.
Ether (B.P.)
Ferrous sulphate (B.P.)
Glycerine (B.P.) Limited quantity available from Tata & Co.
Honey (B.P.)
Hydnocarpus oil (B.P.) *Hydnocarpus wightiana.*
Hydrochloric acid (B.P.)
Hydrogen peroxide (B.P.)
Kaolin (B.P.)
Liver extract (B.P.)
Luminal sodium. Available in limited quantity.
Magnesium sulphate (B.P.) Depends on Sulphuric acid.
Methyl salicylate (B.P.) A very limited quantity may be available from oil Gaultheria.
Morphine and Salts (B.P.)
Nux vomica and preparations (B.P.) *Strychonos nux vomica*
Opium (B.P.) Papaver somniferum.
Oxygen (B.P.)
Paraffin Hard (B.P.) B.O.C. prepares a similar substance.
Paraffin Liquid (B.P.) Available in limited quantity.

Pituitary extract (B.P.)
Plasmoquine. Available in limited quantity.
Prontosil soluble. Similar drugs may be prepared.
Protargol (B.P.) Locally available.
Quinine and salts (B.P.) Available only in limited quantities.
Santonin (B.P.) *Artemisia maritima* and other species.
Sera and Vaccines (B.P.) Neutral glass containers must be made available.
Silver nitrate (B.P.)
Silver proteinate (B.P.) see protargol.
Soft soap (B.P.)
Strychnine HCI. (B.P.) From *Strychonos nux vomica.*
Sulpharsphenamine (B.P.) Limited quantity available from U.D. Co. Calcutta.
Sulphanilamide. Limited quantity manufactured locally.
Sulphuric acid (B.P.) Depends on supply of sulphur.
Tannic acid (B.P.)
Thyroid (B.P.)
Ureastibamine group, including—'Aminostiburea', Ureastibol, etc.

LIST A(2)

Essential Drugs and Medicinal Chemicals which may be manufactured in India under emergency conditions

Adrenaline (B.P.) May be manufactured if glands are made available from slaughter houses.
Atebrin Local manufacture possible.
Atropine (B.P.) From *Atropa belladonna.*
Barium sulphate (B.P.)
Benzoic acid (B.P.) Limited quantity available from Gum benzoin.
Boric acid (B.P.) A limited quantity may be prepared from Borax imported from Tibet by land route.
Calcium carbonate (B.P.)
Calcium chloride (B.P.)
Calcium gluconate (B.P.)
Calcium lactate (B.P.)
Calcium sulphate (B.P.)
Camphor (B.P.)
Charcoal (B.P.)
Chenopodium (B.P.) *Chenopodium ambrosoides.*
Chloral hydrate (B.P.)
Chloretone (B.P.)
Chloroform (B.P.) Depends on supply of Bleaching powder from abroad.
Citric acid (B.P.)
Copper sulphate (B.P.)
Dextrose (B.P.)
Formalin (B.P.)
Gelatin (B.P.)
Glucose liquid (B.P.)
Glycerine (B.P.) Available in very limited quantities.
Hexamine (B.P.) Depends on formalin.
Iodised oil (B.P.) Depends on Iodine.
Lanolin (B.P.)
Lecithin (B.P.C.)
Lime chlorinated (B.P.) Bleaching powder.
Liquorice (B.P.) Glycyrrhiza. Available from Persia.

Magnesium carbonate (B.P.)
Mandelic acid (B.P.) Depends upon C_6H_5COH and HCN.
Novocaine. May be manufactured. Depends on Bromine.
Phenacetin (B.P.)
Potassium carbonate (B.P.)
Potassium bicarbonate (B.P.)
Potassium chlorate (B.P.)
Potassium citrate (B.P.) Depends on Citric acid.
Potassium permanganate (B.P.)
Sanocrysin (B.P.C.)
Silver nitrate (B.P.)
Silver sulphate (B.P.)
Sodium thiosulphate (B.P.)
Starch (B.P.)
Urotropine (B.P.) *See* Hexamine.
Zinc oxide (B.P.)

List A(3)

Essential Drugs and Medicinal Chemicals whose substitutes are available in India

Acacia (B.P.) A. Senegal. Indian substitute A. Arabica.
Acetarsol (B.P.)
Acetic acid (B.P.) A limited quantity is available here.
Acetone (B.P.) Commercial acetone available in limited quantity.
Acriflavine (B.P.)
Adrenaline (B.P.) May be manufactured if glands are made available.
Agar agar (B.P.)
Ammonia (B.P.) Limited quantity available.
Amidopyrine
Amytal (N.N.R.)
Amytal Sodium (N.N.R.)
Aniline (Basic chemical)
Antimony Available from Burma.
Antipyrine (B.P.)
Arsenic trioxide (B.P.)
Arsephenamine (B.P.C.)
Aspirin (B.P.)
Atebrin May be available in limited quantity.
Barbitone (B.P.)
Benzene Basic solvent.
Benzoic acid (B.P.) Limited quantity available from Gum benzoin.
Bismarsen (N.N.R.)
Bismarsen (N.N.R.)
Bismuth carbonate (B.P.)
Bismuth subnitrate (B.P.)
Boric acid (B.P.)
Bromine. Basic chemical.
Calcium carbonate (B.P.)
Calcium chloride (B.P.)
Calcium gluconate (B.P.)
Calcium lactate (B.P.)
Camphor (B.P.)
Carbarsone (N.N.R.)
Carbon tetrachloride

Cardiazol (E.P.)
Charcoal (B.P.)
Chloretone (B.P.)
Chlorine
Chloroform (B.P.) Indian product depends on Bleaching Powder.
Cocaine (B.P.)
Cod liver oil (B.P.)
Cresole (B.P.)
Dextrose (B.P.)
Dichloramine T.
Digalen-Roche (N.N.R.)
Digifolin-ciba (N.N.R.)
Digipoten (N.N.R.)
Digitalin (B.P.C.)
Digitol (N.N.R.)
Digitoxin (B.P.C.)
Diseptal A
Diseptal B
Diseptal C
Emetine (B.P.)
Ergot (B.P.)
Gelatin (B.P.) Only commercial gelatin is available in limited quantity.
Gitalin (N.N.R.)
Glycerine (B.P.) Available in limited quantity.
Hexamine (B.P.) Depends upon formalin.
Homatropine Hydrobromide (B.P.)
Hydrogen peroxide (B.P.) Available in limited quantity.
Ichthammol (B.P.)
Insulin (B.P.)
Iodine (B.P.)
Lanolin (B.P.)
Lead
Lime chlorinated (B.P.)
Liquid paraffin (B.P.) Available in limited quantity.
Liver extract (B.P.)
Luminal sodium (U.S.P.) A brand of " phenobarbital soluble ".
Mandelic acid (B.P.) Depends on C_6H_5COH and HCN.
Medinal (N.N.R.)
Mercuric chloride (B.P.)
Mercuric nitrate (B.P.)
Mercuric oxide (B.P.)
Mercurous chloride (B.P.)
Mercurochrome (B.P.C.)
Mercury (B.P.)
Methyl salicylate (B.P.)
Neoarsphenamine (B.P.) Sulpharsphenamine is locally manufactured in limited quantity.
Novocaine (N.N.R.) May be manufactured. Depends on Bromine.
Paraffin hard (B.P.)
*Paraffin yellow (B.P.)
Petroleum ether. A basic solvent.
Phanodorn (N.N.R.)
Phenacetin (B.P.)
Phenazone (B.P.) See Antipyrine.
Phenobarbitone (B.P.) Luminal—A brand of Phenobarbital.

Phenobarbitone soluble. *See* ' Luminal sodium '.
Phenol (B.P.)
Phosphorus oxychloride. Basic chemical.
Phosphorus pentachloride. Basic chemical.
Phosphorus trichloride. Basic chemical.
Phosphorus pentaide. Basic chemical.
Physostigmine salicylate (B.P.)
Pilocarpine nitrate (B.P.)
Pituitary ext., (B.P.)
Plasmiquine.
Podophyllum (B.P.) Indian substitute—P. Emodi.
Potassium bromide (B.P.) Depends on Bromine.
*Paraffin liquid (B.P.) Limited quantity available from B.O.C.
Paraffin soft (B.P.)
Potassium cyanide (B.P.)
Potassium dichromate. Basic chemical.
Potassium iodide (B.P.)
Potassium hydromide (B.P.)
Potassium permanganate (B.P.) May be manufactured in limited quantity.
Procaine HCl (B.P.) *See* Novocaine.
Prontosil soluble.
Proseptasine.
Protamine zinc insulin (N.N.R.)
Protargol (B.P.) A limited quantity may be manufactured.
Quinine and salts (B.P.) Available in limited quantity.
Salol (B.P.C.)
Salvarasan (B.P.) See Neoarsphenamine.
Sodium bicarbonate (B.P.)
Sodium bromide (B.P.)
Sodium carbonate (B.P.)
Sodium hydroxide (B.P.)
Sodium salicylate (B.P.)
Starch (B.P.)
Stovarsol (B.P.) *See* Acetarsol.
Strophanthin (B.P.)
Sulpharsphenamine (B.P.)
Sulphanilamide (N.N.R.) A limited quantity available here.
Sulphur (B.P.) Basic chemical.
Tetrachlorethylene (B.P.C.)
Thyroxin sodium (B.P.)
Tin. Basic chemical.
Toluene. Basic chemical.
Trichloracetic acid. Basic chemical for Biological Products.
Trinitrophenol (B.P.)
Uleron. *See* ' Diseptal A '.
Urea. Basic chemical.
Urotropine (B.P.) *See* ' Hexamine '.
Ventriculin (B.P.)

LIST A(4)

Essential Drugs and Medicinal Chemicals whose substitutes are available in India

Acacia (B.P.) Indian substitute A. Arabica.
Carbarsone Substitute ' Amibiarsone ' (P.C.P.W. Cal.).

Diseptal A
Diseptal B
Diseptal C
Podophyllum (B.P.) Substitute ' P. Emodi '.

LIST B(1)

Drugs and Medicinal Chemicals of secondary importance available in India

Adhatoda Vasica (B.P.C.)
Aloes (B.P.)
Alum (B.P.) Depends on sulphuric acid
Arachis oil (B.P.)
Arnica (B.P.C.)
Asafoetida (B.P.)
Bees wax (B.P.)
Benzoin (B.P.)
Calcium hydroxide (B.P.)
Capsicum (B.P.)
Caraway oil (B.P.)
Carbon dioxide (B.P.)
Cardamom (B.P.)
Cassia (B.P.)
Catechu (B.P.)
Chiratta (B.P.C.)
Cocculus indicus (B.P.C.)
Colocynth (B.P.)
Colocynth (B.P.)
Colophony (B.P.)
Coriander (B.P.)
Cotton seed oil (B.P.)
Croton oil (B.P.C.) Croton tiglium.
Cubeb (B.P.C.) Piper cubeba.
Cydonia (B.P.C.)
Datura straminium (B.P.C.)
Diastase (B.P.C.)
Eucalyptus oil (B.P.)
Fennel (B.P.)
Ginger (B.P.)
Grindelia (B.P.C.)
Holarrhena (B.P.C.)
Hydrogen
Hyoscyamus and preparations (B.P.—H. niger)
Kaolin (B.P.)
Lemon Oil (B.P.) available in limited quantity.
Linseed (B.P.)
Linseed oil (B.P.)
Musk (B.P.C.)
Naphthol (B.P.)
Neocinchophen (B.P.C.)
Nitric Acid (B.P.)
Nitrogen
Ox-bile (B.P.)
Peptone (B.P.C.)
Picrorhiza (B.P.C.)

Plantoago ovata (B.P.C.)
Potassium nitrate (B.P.)
Pyrethri (B.P.C.)
Rhubarb (B.P.)
Sandalwood oil (B.P.)
Senna (B.P.)
Sesame oil (B.P.)
Soap curd (B.P.)
Soap hard (B.P.)
Spirit methylated
Stramminium and preparations (B.P.)
Sucrose (B.P.)
Sumbul (B.P.C.)
Supra-renal cortex (ext.) (B.P.C.)
Tamarind (B.P.)
Taraxacum (B.P.C.)
Turpentine oil (B.P.)
Turpeth (B.P.C.)

LIST B(2)

Drugs and Medicinal Chemicals of secondary importance which may be manufactured in India under emergency conditions

Acetanilide (B.P.C.)
Acetyl chloride—Basic chemical.
Almond oil (B.P.)
Aluminium chloride (B.P.C.) Limited quantity may be prepared locally.
Ammonia aromatic spirit (B.P.) Depends on supply of $(NH_4)_2$ CO_3
Ammonium carbonate (B.P.) Depends upon NH_4OH
Ammonium chloride (B.P.)
Amyl alcohol (B.P.C.) May be available in limited quantity.
Amyl nitrite (B.P.)
Anise oil (B.P.)
Apromorphine HCl (B.P.)
Arsenical solution (B.P.)
Benzaldehyde (B.P.C.)
Berberine sulphate (B.P.C.)
Borax (B.P.)
Cantharidine (B.P.)
Chenopodium (B.P.)
Chloracetic acid—Basic Chemical. Depends upon chlorine and acetic acid.
Cinnamin (B.P.)
Clove oil (B.P.)
Conessine Available Holarrhena Antidysenterica.
Copper sulphate (B.P.)
Cotarnine (B.P.C.)
Dimethyl sulphate. Basic Chemical.
Ergosterol (B.P.) May be prepared in limited quantity.
Ethylene (B.P.)
Eucalypton (B.P.) Limited quantity may be available for Eucalyptus oil.
Ferriarsenus (B.P.C.)
Ferric chloride (B.P.)
Ferriet-strychnine (B.P.C.)
Ferrous iodide (B.P.)
Ferrous phosphate (B.P.)

Ferrous quinine and Strychnine (B.P.)
Gentian (B.P.)—Subst.—Gentiana kurroa, chiratta.
Hyoscine H. Br. (B.P.)
Iodiform (B.P.) Depends upon Iodine.
Iron ammonium citrate (B.P.)
Iron quinine citrate (B.P.C.)
Iron carbonate (B.P.C.)
Lactic acid (B.P.) Depends upon Lactose.
Lactose (B.P.)
Lead acetate (B.P.) Depends upon acetic acid.
Lead oxide (B.P.)
Lead subacetate (B.P.)
Lemon oil (B.P.) Available in limited quantity.
Magnesium bicarbonate (B.P.)
Magnesium oxide (B.P.)
Nitrus ether spt. (B.P.)
Pancreatin (B.P.)
Papin (B.P.C.)
Paraldehyde (B.P.)
Parathyroid extract (B.P.C.)
Pepsin (B.P.)
Potassium acetate (B.P.)
Salicin (B.P.)
Sodium benzonate (B.P.)
Sodium citrate (B.P.)
Sodium hydrosulphide. Useful chemical.
Sodium tarrocholate.
Sulphur pptd. (B.P.) Depends on sulphur.
Tartaric acid (B.P.)
Tartaric acid (B.P.)
Terebene (B.P.)
Theobromine (B.P.)
Thymol (B.P.)
Zinc chloride (B.P.)
Zinc sulphate (B.P.)

LIST B(3)

Drugs and Medicinal Chemicals of secondary importance which are to be procured from Neutral Countries

Acetic anhydride (B.P.) Basic chemical.
Adalin *See* carbromal.
Alepol (B.P.C.) Similar products may be easily manufactured.
Aluminium chloride (B.P.C.)
Alurite (N.N.R.)
Ammonia aromatic spirit (B.P.)
Ammonium carbonate (B.P.) May be manufactured in limited quantity.
Ammonium chloride (B.P.) May be manufactured in limited quantity.
Amyl alcohol (B.P.C.)
Anaesthesin (N.N.R.)
Anise oil (B.P.)
Arsenic triiodide (B.P.)
Balsam of peru (B.P.)
Balsam of Tolu (B.P.)

Barosma betulina (B.P.)
Barium hydroxide. Basic chemical.
Benxocaine. *See* Anaesthesin.
Benzoyl chloride. Basic chemical.
Bismuth salicylate (B.P.)
Bromural (N.N.R.)
Bryonia (B.P.C.)
Buchu (B.P.C.)
Carbon disulphide (B.P.C.) Basic chemical.
Carbon tetrachloride (B.P.)
Carbromal (N.N.R.)
Cascara sagrada (B.P.)
Cascarilla (B.P.C.)
Chloramine T. (B.P.)
Chiniofon (B.P.)
Chinoform (E.P.)
Chloracetic acid. Basic chemical.
Chlorsulphonic acid. Basic chemical. Depends on fuming sulphuric acid.
Chrysarobin (B.P.)
Cimicifuge (B.P.C.)
Cinchophen (B.P.)
Collodion (B.P.)
Colophony (B.P.)
Copaiba (B.P.)
Cotarnine (B.P.C.)
Creesote (B.P.)
Dibromin (N.N.R.)
Dill oil (B.P.)
Dimethyl sulphate. Basic chemical.
Emetine bismuth iodide (B.P.)
Epinephrine (B.P.)
Ergometrine (B.P.)
Ergosterol
Erythrityl tetranitrate (B.P.)
Euonymus cortex (B.P.C.)
Euphorbia (B.P.C.)
Euresol (N.N.R.)
Ferrous phosphate (B.P.)
Gelsemi (B.P.C.)
Gentian violet (B.P.C.)
Guaiacol (B.P.)
Gynergen (N.N.R.)
Hexyl resorcinol (B.P.C.)
Hydrobromic acid (B.P.)
Hydrocynic acid (B.P.)
Hydriodic acid (B.P.)
Hydrastis (B.P.C.)
Iodophthalein (B.P.)
Ipecacuanha radix (B.P.)
Jaborani (B.P.C.)
Jalap (B.P.)
Kava (B.P.)
Krameria (B.P.)
Lactic acid (B.P.)
Lactose (B.P.)

Laevulose (B.P.)
Lead acetate (B.P.)
Lithium citrate (B.P.C.)
Lobelia (B.P.)
Male fern (B.P.)
Mapharsen (N.N.R.)
Matica (B.P.C.)
Menthol (B.P.)
Mersalyl (B.P.)
Bethylene blue (B.P.)
Methyl sulphonal (B.P.)
Myrrh (B.P.)
Naphthol (B.P.)
Neocinchophen (B.P.C.)
Nitrus ether spt. (B.P.)
Novatropine (N.N.R.)
Olive oil (B.P.)
Ouabain (N.N.R.)
Optochin (N.N.R.)
Ortal sodium (N.N.R.)
Orthocaine (B.P.)
Orthoform. *See* orthocaine
Oxalic acid (B.P.C.)
Paludex
Pancreatin (B.P.)
Parathyroid extract (B.P.C.)
Peppermint oil (B.P.)
Phenol Red (B.P.C.)
Phenolphthalein (B.P.)
Phosphoric acid (B.P.)
Potassium acetate (B.P.)
Potassium antimony tartrate (B.P.)
Pruni verg (B.P.)
Prophulene Glycol (N.N.R.)
Pyridine. Basic chemical.
Quassia (B.P.)
Quillaia (B.P.)
Quinine Bismuth Iodide (N.N.R.)
Saccharin (B.P.C.)
Salicin (B.P.)
Sarsae (B.P.C.)
Sabina (B.P.C.)
Scammony Resin (B.P.)
Senega (B.P.)
Sodium acid phosphate (B.P.)
Sodium Antimony Tartrate (B.P.)
Sodium Benzonate (B.P.)
Sodium Hydrosulphite ($Na_2S_2O_4$). Useful for synthetic drug.
Sodium Iodide (B.P.)
Sodium Nitrate. Basic chemical.
Sodium Nitrite (B.P.)
Sodium Phosphate (B.P.)
Sodium Potassium Tartrate (B.P.)
Solganol
Solganol B.

Solu septasin
Squill (B.P.)
Sulphonel (B.P.)
Sulphur dioxide.
Tartaric acid (B.P.)
Theobromine (B.P.)
Theophylline (B.P.)
Thionyl chloride. Basic chemical.
Tragacanth (B.P.)
Trimethylene Glycol. Basic chemical.
Traypansamide (B.P.)
Uva ursi (B.P.C.)
Valerian (B.P.)
Viburnum (B.P.C.)

List B(4)

Drugs and Medicinal Chemicals of secondary importance whose substitutes are available in India

Alepol (B.P.C.) Similar products may be manufactured here.
Buchu (B.P.C.) Subst.—Boerhavia diffusa.
Cascarilla (B.P.C.)
Chenopodium oil (B.P.) Subst.—C. Album and C botrys.
Cimicifuga (B.P.C.) Subst.—C. Foetida.
Colchicum and preparations (B.P.) Subst.—Cluteum.
Copaiba (B.P.)
Dill oil (B.P.) Subst.—Apium graveolens, anethum sowa.
Euonymus cortex (B.P.C.)
Euphorbia (B.P.C.) E. Pilulifera.
Gentian (B.P.) Gentiana kurroo, chirata.
Guaiacol (B.P.) Subst.—Gum Kino
Hydrastis (B.P.C.) Subst.—Berberis.
Lobelia (B.P.) Subst.—L. nicotinnaefolia.
Myrrh (B.P.) Subst.—Species of Balsamodendron.
Olive oil (B.P.) Subst.—Arachis oil.
Plantoage ovata (B.P.C.) Subst.—P. Syllium.
Pruni verg (B.P.) Subst.—P. Amara.
Quassia (B.P.) Subst.—Picrasma quassioides.
Sarsae (B.P.C.) Subst.—Hemidesmus indicus.
Senega (B.P.)
Sodium Nitrate. Basic chemical, Subst. KNO_3
Squill (B.P.)
Uva ursi (B.P.C.)
Valerian (B.P.) Subst.—V. Wallichii.
Viburnum (B.P.C.) Subst.—V. Foetidum, Abroma augusta, etc.

APPENDIX IX

Summary of the Development of the Indian Pharmaceutical Industry.

By

MR. P.M. NABAR, CHIEF ADVISORY CHEMIST, DIRECTORATE GENERAL OF HEALTH SERVICES (MINISTRY OF HEALTH), NEW DELHI.

India depends for her supply of medical stores, drugs, etc., on foreign countries, i.e., on the importing trade and also on her own Pharmaceutical Industry.

The Development of the Indian Pharmaceutical Industry may be dealt with in three main stages as under :—

1. Pre 1914 stage, i.e., before the first World War.
2. The period between the beginning of World War I and that of World War II.
3. The period of development during World War II and subsequent period.

Period (1)—*i.e., before the first World War:* The Industry was then practically in its infancy. Its activities were confined almost exclusively to the manufacture of easily made galenicals, i.e., drugs prepared in spirit, and a few proprietary medicines. In the real sense of the term it can be stated that the Pharmaceutical Industry in India started its development with the establishment of drug factories at the Government Medical Store Depots at Bombay, Madras, Calcutta and Lahore, which started the manufacture of drugs according to the British Pharmacopoeia standards for Government requirements and also the Government factories for the manufacture of quinine in the Provinces of Madras and Bengal from indigenous Cinchona Plantations. The principal idea underlying the establishment of the Government Medical Stores factories was that they should serve as a model and guide for private enterprise. Their methods were economical and the products were available at rates cheaper than those obtained from the trade. These factories manufactured galenicals and other Pharmaceutical preparations such as pills, tablets and certain special products required by Government Medical Institutions.

Period (2)—*i.e., Period between the beginning of World War I and that of World War II*

During World War I the demands for medical supplies increased. During that period the manufacture of essential oils such as Sandalwood Oil, Dill Oil, Lemongrass Oil, etc., was established. The manufacture of vegetable oils from seeds by expression increased enormously. Gradually the manufacture of santonin and preparations of belladonna and other vegetable products was taken up by private enterprise. The manufacture of certain special biological products, such as vaccines, sera etc., was subsequently started at the Central Research Institute, Kasauli, Haffkine Institute, Bombay, and the King Institute, Guindy, mainly with a view to ensuring steady supplies of these products to meet Government requirements. These institutions were intended to act as a guide to the trade. Products manufactured by these Institutes now include Cholera Vaccine, Typhoid Vaccine, Plague Vaccine, Small Pox Vaccine, Anti-Rabic Vaccine and Anti-Vanom Serum. Just as the Medical Stores Department of the Government of India has been the pioneer in the manufacture in India of drugs, these Institutes have been model institutions in regard to the preparation of biological products and the attendant research.

World War I gave an impetus to private enterprise and many Pharmaceutical concerns were established in India particularly in Bengal and Bombay. In the succeeding years this Industry began to develop slowly in India, and some new concerns were established for the manufacture of vaccines, sera and other biological products. In the year 1930, the Government of India appointed the Drugs Enquiry Committee with a view to investigate into the extent to which drugs and chemicals of impure qualities or defective strengths particularly those recognized by the British Pharmacopoeia, were imported, manufactured or sold in India and the necessity in the public interest of controlling such importation, manufacture and sale and also to make recommendations in regard to the control of standards and legislation to restrict the profession of Pharmacy to duly qualified persons.

At the beginning of World War II, Indian Industry had developed slowly and could produce all the galenicals, ether, chloroform, various medicinal tablets and pills, ointments, dressings and disinfectants of the required standards in addition to certain other basic chemicals. With this development, the import of these drugs decreased considerably. Even before World War II, Government requirements of items which were manufactured in India using Indian or imported raw material were mainly obtained from Indian manufacturers.

Period (3)—*i.e., the period of development during World War II and subsequent period*

As World War II progressed, supplies from abroad were reduced to the minimum and the Government of India took active steps to promote the development of the Drug Industry in India. A scientific survey of the productive capacity of pharmaceuticals was made in 1940 by a questionnaire to the various manufacturing concerns in the country and help was given for expanding their production by the provision of technical advice and facilities for importing raw materials and machinery. During this period the Government of India appointed a Drug Supply Committee in which the trade was represented to assist the Industry in its development. A list of vegetable crude drugs included in the British Pharmacopoeia was prepared with a view to investigate the possibility of growing these drugs in India. Certain indigenous drugs were used as substitutes in Pharmaceutical preparations in place of imported drugs.

The manufacture of inorganic salts such as Ferrous Sulphate, Potassium Permenganate, Magnesium Sulphate was stepped up. In addition to these, considerable quantities of proprietary liquid and solid drugs were manufactured by the trade in India.

Steps were taken to establish the production of alkaloids in India including those of Opium. Consequently the manufacture of Codeine, Atropine, Emetine, Strychnine and Ephedrine etc., was developed. It is gratifying that India exports large quantities of Strychnine to-day.

Amongst other drugs, whose manufacture was established during this period, synthetic drugs such as Urea Stibamine, Carbarsone, Quiniodochlor (also known as Enterovioform) and coal tar products like Phenol, Cresol, Napthalene and other disinfectants are the most important ones.

India can now produce a variety of essential oils.

Special mention must be made of two important industries developed during World War II—(i) Shark Liver Oil, and (ii) Pyrethrum.

With an abundance of sharks near the Indian coast line, the Shark Liver Oil Industry, which was first started under Government auspices in Madras, is now established in the maritime Provinces and States. India can now not only meet all her requirements of indigenous shark liver oil—a substitute for cod liver oil—but is also in a position to export large quantities both medicinal and other varieties. This has made her independent of imported cod liver oil.

Pyrethrum was first cultivated in Madras Province and Kashmir and it has been conclusively proved that the variety grown in Palni Hills in Madras Province compares favourably with the imported flowers so far as Pyrethrin content is concerned. During the war large quantities of Pyrethrum Extract for use in the extermination of mosquitoes and other insects were manufactured in the country, the pioneers being the Government factories of the Medical Store Depots.

Indian Pharmacopoeial List

A word about the Indian Pharmacopoeial List. As a prelude to the Indian Pharmacopoeia, the Government of India had appointed a Committee known as the Indian Pharmacopoeial List Committee in 1945 to prepare material for a list of drugs in use in India, not included in the British Pharmacopoeia, but of sufficient value to justify their inclusion in an official Pharmacopoeia. As a result of the recommendation of this Committee the Government of India published the Indian Pharmacopoeial list in 1946, consisting of monographs of about 180 drugs which would form a nucleus of the future Indian Pharmacopoeia.

The Government of India have set up Development Committees for assisting the development of the various types of pharmaceutical industry. They have also taken steps to render every possible assistance for the import of raw materials and machinery.

India has yet to make a headway in the manufacture of those synthetic drugs and biological products which have not so far been produced here, such as sulpha drugs, vitamins, penicillin etc. Indian

Industry is now beginning to focus attention on this subject and is becoming alive to the need of active research towards the successful development of the manufacture of such products.

A Drugs Research Institute under the Board of Scientific and Industrial Research is being established and this Institute will be of great help to Government and private enterprise in this field. The enforcement of the Drugs Act will help the pharmaceutical industry in India to a considerable extent by promoting the effective control of the standards and purity of the imported and locally manufactured drugs.

The question of the development of the drugs industry in India has been receiving serious attention of the Government of India. In order to proceed with the problem, the late Planning and Development Department of the Government of India set up various panels, one of them being the panel for pharmaceutical and fine chemicals. This panel suggested certain targets of production. As a result of the report of the panel, a team of experts was sent abroad to study the latest methods of manufacture of penicillin, sulpha drugs and synthetic anti-malarials, vitamins and hormones. This team has recently returned to India after completing its investigations.

This is only a brief outline of the growth and development of Pharmaceutical Industry in India. Considering that India imported annually drugs worth about two crores of rupees before the war and now imports of about six crores, the economic aspect of the developments under consideration will be apparent. In penicillin and its preparations alone we shall save nearly a crore of rupees annually once the Penicillin Industry is established here. Besides the monetary saving, there is the prospect of providing employment to a number of trained personnel in the country.

In short, it is expected that before long India will have a stable Drug Industry manned by qualified Technologists and Pharmacists. This will naturally be the result of our efforts to step up Indian Industry, added to the result of the introduction of legislation with regard to standards and purity of drugs and the regulation of the profession of Pharmacy and education of Pharmacists.

APPENDIX X

Conclusion

It would appear that a considerable amount of the development of the drug industry took place during the war years notwithstanding the many handicaps from which the industry suffered. It is possible for India to be self-sufficient so far as the drug requirement of her teeming millions is concerned if the industry is planned on a rational basis. The chief obstacles in the path of a healthy development are:

(i) lack of basic chemicals available at a reasonable rate
(ii) lack of certain type of equipment
(iii) absence of a Pharmacy Act and a Therapeutic Trials Committee with authority to ban the marketing of questionable products.

A Central Standardisation and Testing Laboratory is essential if the confidence of the public in the Indian product is to be won. There is need for a Central Drug Research Laboratory where the chemistry of synthetic drugs should be investigated, aided by adequate staff of pharmacologists and clinicians. The central figure in such an organisation is necessarily the chemist as he has to plan the molecular structure necessary to produce the desired physiological effect.

In India, transport and freight of raw materials have been one of the chief obstacles in the development of many industries and the drug industry, in particular, suffered greatly on these accounts.

Diseases like malaria, cholera, dysentery, venereal diseases, tuberculosis, which are the principal scourges of this country could be successfully combated by a mass scale manufacture of the remedies at a cost which the Indian Exchequer can bear comfortably. Nutritional deficiency so rampant in this country can also be overcome by proper planning of production of medicaments and accessory food substances. But a long term planning is absolutely necessary.

The writer of this note regrets that owing to lack of leisure, this survey has been rather sketchy, and perhaps does not give adequate idea of what has been done and what can still be done. The fact that under very trying conditions, India was able to produce 60 to 70 per cent of medical requirements of the Defence Services is enough for one to build high hopes for the future when under peaceful conditions more could be achieved, provided the course is set for the objective without further loss of time.

Sd. J. N. Ray
Director, Drugs & Dressings

APPENDIX XI

History of the Planning, Developments and Production of Surgical Instruments, Surgical Appliances, Miscellaneous Medical Stores and Medical Containers in India since the Commencement of War

By

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DIRECTORATE GENERAL OF INDUSTRY AND SUPPLY.

Introductory

(1) During War years, at irregular intervals, brief narratives have been supplied by officers of the Instruments and Appliances Directorate on the development of planning and production of surgical instruments and appliances but it appears from these that whereas considerable prominence has been given to the development of instruments, insufficient mention has been made of the difficulties encountered and overcome in the production of Surgical Appliances, Miscellaneous Medical Stores and Medical Containers.

(2) It is, therefore, intended now that hostilities have ceased, to review the procurement of all these stores from March 1941 when the responsibility for their supply to the Defence Services became that of the Supply Department and to place in proper perspective, by means of statistics, the importance of each group of stores.

(3) The procurement, storage and issue by Government of raw materials specially intended for the manufacture of medical supplies was an important contributory factor towards the success that was achieved in maintaining a constant flow of medical supplies to the Defence Services during the war years. In this review, therefore, special mention has been made of the raw materials procured and supplied for each group of stores.

Early Organisation

(4) Although the procurement of medical stores became the responsibility of Supply Department in March 1941, the existing procurement organisation, such as it then was, which had been set up by the DGIMS, was allowed to remain. This consisted of Medical Store Depots at Calcutta, Bombay, Karachi, Lahore and Madras in the charge of Deputy Assistant Directors General who were authorised to purchase medical stores in their respective areas up to predetermined limits. At the centre a Director of Production, Instruments and Appliances, had been in charge of procurement of all medical stores (including drugs).

Appointment of Technical Officer

(5) In May 1941, it became necessary to appoint a Technical Officer possessing specialised knowledge of Carbon Steel and Stainless Steel etc., to assist the Director of Production in his work which at that

time was principally devoted to the development of the surgical instrument industry. Mr. E. T. Ibbitt, formerly of Messrs. Arthur Balfour & Co. Ltd., Capital Steel Works, Sheffield, was appointed to this post on 1 May, 1941.

Restricted Activities of Production Officers in 1941

(6) Owing to the system of provisioning and purchase in force at the time these officers were somewhat restricted in their activities during the first few months of 1941 and consequently they devoted most of their time to the inspection of factories and workshops in the main instrument producing centres and made general preparations for the expansion of the industry.

(7) It was found that the instruments being manufactured were mainly those in common use such as artery forceps, scissors, retractors, etc. More delicate instruments such as ophthalmic, ear, nose and throat and also cutting instruments were also being produced in small quantities. The quality of instruments did not in any way approach the U.K. standard and consequently the majority of instruments in use in hospitals were of U.K. manufacture. The industry did, however, compete in the cheaper market of India, Middle East, South Africa and Australia and the export trade was, for inferior quality instruments, fairly considerable. The industry, which was centred mainly in Sialkot and to a lesser extent in Lahore, Bombay, Calcutta and Madras relied almost entirely on hand labour. Machinery was only employed for grinding and polishing. Whilst the standard of workmanship up to the finishing stages was undoubtedly a high one, lack of metallurgical knowledge, almost blind faith in antiquated methods of heat treatment and non-appreciation of the fundamentals necessary for efficient nickel plating were the main drawbacks to the production of instruments of quality. The industry was also handicapped at that time by (1) the necessity of producing small quantities of multitudinous types of instruments and (2) lack of specifications to describe the instruments required. More often than not a manufacturer's only guidance in producing a satisfactory instrument would be a reference to an illustration appearing in an English catalogue. Even under these circumstances instruments of fairly satisfactory shape and size were produced with the help of local surgeons.

Early System of Provisioning and Purchase

(8) It is reiterated that during the first ten months of 1941 long-term planning of production was handicapped by the inadequate system of provisioning and purchase then in force. Provisioning consisted of demands for so many field units or list of reserves termed " U.B. lists " for delivery in a short period. Stores against these demands were purchased locally by the DADGS of four different Medical Store Depots. This resulted in manufacturers receiving numerous small orders for the same item. Delivery periods stated were invariably short and consequently individual manufacturers were unable to organise their factories for concentration on the continuous production of selected items.

Early System of Inspection

(9) Inspection of instruments was performed by the DADG (M.S.) at the nearest depot, assisted in the case of Lahore and Bombay by the Military Surgical Specialist. Owing to the acute shortage of stores and the undeveloped state of the industry, the standard of quality demanded at inspection could not be set at a high level. Stores were accepted provided they were considered suitable for the purpose for which they were intended. As stores were accepted by four different depots, the standard varied very considerably.

First Step towards Standardisation of Surgical Instruments

(10) The first important step for reorganisation was taken by the DGIMS in May 1941. The DGIMS convened a Committee of twenty-three of the leading surgeons in India embracing all branches of surgery. The DMS was also invited to appoint military specialists to the Committee. The Committee which was called the " Surgical Instruments Standardisation Committee " drew up schedules of instruments for all branches of surgery for use in the army and in civil. The multiple types previously demanded by the army were cut down to the minimum consistent with efficiency. A catalogue reference was allotted to each instrument. These schedules were accepted by the DMS who drew up fresh equipment scales for all units. A new PVMS based on the schedule was prepared.

Re-organisation of Provisioning Methods and the Establishment of Central Purchase

(11) The DMS then re-organised his provisioning methods. Demands for instruments in the new PVMS were prepared for delivery over a period of 18 months. DGIMS received the first of these demands in October, 1941. Whilst the policy of central purchase had been decided upon earlier in the year, it did not become operative until the 1st of January, 1942. The Director of Instruments and Appliances was, however, obliged to take early action on the demands received from the DMS and the placing of the first large orders by the Deputy Assistant Director General of the Medical Store Depots was initiated by him. When deliveries of the large quantities of stores thus ordered commenced in December, 1941 more adequate inspection was ensured by the appointment of a special officer at the Medical Store Depot, Lahore Cantt. which was the chief receiving centre for instruments.

(12) The adoption of forward provisioning and central purchase immediately led to a big expansion in the production of instruments and appliances. Manufacturers, under the stimulus of orders for a large number of instruments and appliances required over a long period, were encouraged to expand their factories. Selected instruments were allotted to the firms best suited for these instruments and, as far as was possible, subsequent orders for a particular instrument were placed with the manufacturer who had given a satisfactory performance. The increased output of the industry is endorsed by the fact that during the months December 1941 to April 1942 the average monthly output of

such instruments as artery forceps, dissecting forceps, scalpels and scissors was 5,10,000.

(13) What was at that time thought to be a satisfactory standard of quality was ensured by having all tender samples approved and sealed by the DMS and the inspection of bulk supplies carried out by a staff under the charge of a special officer who was a surgeon.

Transference of Responsibility for Inspection to the Controller General of Inspection

(14) It was fully realised in these early days and more so when complaints in regard to the quality of surgical instruments began to filter through, that the inspection arrangements then in existence were somewhat inadequate and, therefore, on the 4th February, 1942, the responsibility for the inspection of all medical stores was assumed by the Controller General of Inspection. One of the main initial tasks of the Inspectorate was to prepare specifications which included scale drawings for the instruments required in large quantities, e.g. artery forceps, dissecting forceps, scalpel scissors etc.

Provision of Raw Material for Surgical Instrument Manufacture

(15) In May 1941, it was realised that there could be no long-term planning of instruments production until continuity of raw material supplies was ensured. At that time only Carbon Steel of U.K. and Continental manufacture was being used for instrument production and as the importation of these materials had practically ceased shortly after the commencement of war, the supply position was fast becoming desperate as the production of such steels in India had barely started. Upon the outbreak of war the tool steel stocks of enemy firms operating in India were frozen and in 1941 certain sizes and qualities considered by the Technical Officer to be suitable for instrument production were taken over by the DGIMS and stocked in the Medical Store Depots at Calcutta and Bombay until such time as it became necessary to issue these materials to manufacturers. Steps were also taken at the same time to augment these stocks by ordering 25 tons of Carbon Steel from an Indian manufacturer.

Early Attitude in Respect of Appliances, Miscellaneous Medical Stores, Medical Containers and the Provision of Raw Material for these Stores.

(16) When these initial steps to establish stocks of raw materials necessary for surgical instrument production were taken, it was not thought likely that the supply position of materials for appliances, miscellaneous medical stores and medical containers would ever become really serious as (i) materials of indigenous origin were suitable for such stores, (ii) indigenous raw materials were readily available at that time, and (iii) the large demands for such stores which were subsequently placed could not be anticipated.

(17) For some considerable time, therefore, the supply of instruments and the development of the instrument industry reigned supreme

in the minds of all concerned and the significance of appliances and other medical stores was not fully appreciated.

Effects of Specifications on Surgical Instrument Production

(18) The first specifications for various types of instruments issued by the Inspectorate disturbed the manufacturers considerably. They had not previously worked to such specifications. They found difficulty in reading the drawings provided with each and considered it impractical to supply in accordance with such drawings. The new standards resulted in heavy rejections. The manufacturers were discouraged and the quantity of acceptable instruments supplied each month declined sharply.

The Meeting held by CGI on 25-7-1942 *Regarding Surgical instruments*

(19) In July 1942, the technical officers of the CGI expressed dissatisfaction with the standard of instruments being supplied and on the 25th July, a meeting was held in the CGI's Office to discuss ways and means of improving quality. The DGIMS and the DMS were represented at this meeting. It was decided (i) to tighten up inspection still more, (ii) to ask the DGMP to provide a heat treatment centre at Sialkot, (iii) to divert certain instruments to the U.K. (a sub-committee was formed with this object in view), (iv) to recommend the appointment of an Industrial Planning Officer with U.K. experience of instrument production to operate in Sialkot and (v) " to recommend that the Financial authorities accept the DGIMS advice on the deciding of tenders to a greater degree than at present in particular reference as to which tenders should be placed on Messrs. Powells Ltd., Bombay after recommendation by the sub-committee ".

Results of the CGI's meeting the Surgical Instrument Committee and the Transference of Responsibility for Development of the Instrument Industry

(20) It can be said truthfully that this meeting subsequently led (1) to the appointment by the Adjutant General of " The Surgical Instrument Committee " under the chairmanship of Brig. Grant-Massie which held its first meeting on 27-11-1942 (See Annexure I for the terms of reference of this Committee), (2) to the visit of Mr. F.G.S. Martin, Additional DGMP to Lahore and Sialkot on 17-1-1943, (3) to the CGI's assumption of responsibility for the technical development of surgical instrument production in January, 1943 and finally to the appointment by the DGI of Mr. A. P. Taylor-Gill, formerly of the DGMP's organisation to the post of Control Officer (Surgical Instrument Development) located in Sialkot.

The Attitude of DGIMS to the Transfer of Responsibility for Development

(21) During this transition period which virtually lasted from July 1942 to February 1943, feeling ran high both in official and non-official circles. Production was declining due to what some thought to be unnecessarily rigorous inspection. There existed a sharp divergence of opinion between surgeons as to what was an acceptable standard.

The need for large quantities of usable instruments was becoming more and more urgent. The attitude of one faction was that only the best were acceptable whereas the other faction thought that the spirit of ' make do ' should be more broadly adopted. The DGIMS who was then responsible not only for instrument production but also for the planning and purchase of appliances, miscellaneous medical stores and medical containers, the significance of which had by this time become only too apparent, finally adopted the attitude that surgical instrument supplies would continue to decline unless the responsibility for development as well as inspection was vested in the CGI's organisation. It seemed obvious that given this joint responsibility, unnecessarily rigorous inspection would reflect to the disadvantage of the DGI's development organisation and would, therefore, be eradicated. The transference of responsibility for instrument development to the DGI was, therefore, accepted and, in fact, welcomed by the DGIMS as he was thus given more time to devote to appliances and other less technical medical stores the value of which far exceeded the value of instruments being purchased at that time.

Initial Activities of the Control Officer—Installation of Furnaces etc. Transfer of Raw Material to Sialkot and Bombay—Steps taken to Increase Stocks of Raw Material

(22) The Control Officer (S.I.D.) with a staff of two officers commenced work in Sialkot on 10-2-1943. Shortly afterwards his staff was considerably increased and his activities were extended to the Bombay area. Pyrometrically controlled cokeburning heat treatment furnaces were set up in the works of firms who expressed willingness to co-operate in the DGI's development scheme. Gauges and dies were made under the direction of the Control Officer. Nulling machines were installed to ensure regularity in the ratchets of instruments such as artery forceps. Stocks of carbons steel previously mentioned in this review were transferred to Sialkot and Bombay so that they could be tested and issued under the direction of the Control Officer. In consultation with the Deputy Director of Planning (Technical)—formerly designated as the Technical Officer (S.I. & A.)—stocks of indigenously produced carbon steel were increased and as a forward planning measure steps were taken to obtain stainless steel of suitable quality from Messrs. The Tata Iron and Steel Co. Ltd. Supplies of acceptable instruments increased rapidly and for the time being at any rate instrument production took a back seat in the scheme of things.

The Iron and Steel (Control of Distribution) Order and its Effect on Appliance and Miscellaneous Medical Stores Procurement

(23) It is now possible to devote some space to the activities of the procurement organisation in respect of appliances, miscellaneous medical stores and containers. As previously stated, difficulties in regard to the supply of raw materials for these stores were not at first anticipated. On 1st August 1941, the Iron & Steel (Control of Distribution) Order came into force and this was virtually the first indication that the supply position of mild steel in various forms had deteriorated.

After 1st August 1941, orders placed on firms had subsequently to be supported by licences for the acquirement of steel in a forward period. This procedure was soon found to delay procurement considerably as (i) no specifications were at that time available for medical stores and consequently it was almost impossible to check the demands for raw materials which were made by firms subsequent to the placing of orders (ii) the licence issuing authority, viz., DGMP Calcutta, would not issue licences until he was quite satisfied that the quantities applied for were not in excess of actual requirements (iii) when licences were eventually issued these only permitted the materials to be procured from steel producers in the distant future. Admittedly it was supposedly possible to cash forward period licences immediately from local controlled stockists, by insofar as medical stores were concerned this rarely happened as more often than not only regular sizes and sections were readily available and the comparatively small quantities of peculiar sizes needed for appliance manufacture could not be supplied except within the forward period stated on the licence.

Initial Steps taken to Overcome Delay in Appliance Procurement due to Raw Material Difficulties

(24) This state of affairs was not allowed to persist for very long before it was thought necessary for the DGIMS to become his own licence issuing authority. A sub-quota allotment of all classes of steel required for the production of medical store items was obtained from the DGMP for acquirement in Period II (1942) i.e. April to June and thereafter licences for iron and steel materials for medical store items were issued by the DGIMS without reference to the DGMP This step only eliminated the delay in obtaining licences from another department and the physical acquirement of raw materials remained just as difficult. It was, therefore, decided to build up a stock of the particular sizes and sections of material required for appliance production and initial indents for such materials, duly supported by licence issued by the DGIMS from his own sub-quota allotment, were placed on the DGMP in March 1942, after exhaustive enquiries had been made by the Deputy Director of Planning as to the sizes in most common use for appliance and aseptic furniture manufactured. Subsequently reasonably large and representative stocks were built up and these have since contributed greatly to the success which was undoubtedly achieved in supplying finished surgical appliances and miscellaneous medical stores to all demanders.

Provision of Tinplate for the Manufacture of Containers

(25) The fall of Malaya resulted in a serious situation arising in regard to the support of tinplates for container manufacture. Hitherto the procurement of tinplate containers had not been regarded as a serious issue as there had been no noticeable shortage and in any case tinplates were available from indigenous sources. The sudden shortage of tin materially altered the state of affairs, however, and Appliances Directorate, therefore, brought to the notice of Drugs and Dressings Directorate the probable bottleneck which would occur if the procurement of

containers either by firms or by Government did not keep pace with the production of drugs. As a result it was decided to inaugurate a stock of tinplate to provide against probable shortage in the not too distant future. Utilising the sub-quota of tinplates allocated to the Medical Division from the DGMP's main quota licences were issued and indents for tinplates were placed. It was not known with any degree of certainty which sizes and gauges of tinplates could be the most useful but it was known that the Instruments and Appliances Directorate would, sooner or later, have to provide large quantities of over 70 different types of containers and it was, therefore, considered that by correct planning almost any size of tinplate could be used. First orders for tinplates were placed early in 1942 and the materials began to arrive in July of that year. Stocks were gradually increased and early in 1943, when the first large demands for containers were received in the Instruments and Appliances Directorate, it was possible to issue all the necessary raw materials from stocks. Since then the procurement of metal containers has involved a great deal of difficult planning on the part of the Instruments and Appliances Directorate but it can be said that the activities of the Drugs and Dressings Directorate were never seriously curtailed for want of containers during war years and that this phase is principally due to the forward provisioning in tinplate the initiative for which can be credited to the Instruments and Appliances Directorate.

Formation of Medical Division

(26) As mentioned earlier in this review, the responsibility for procurement of medical stores was that of the Supply Department from the beginning of March 1941 but the procurement organisation was actually under the nominal control of the DGIMS. In May 1943, it was decided to bring the existing procurement organisation under the physical control of the Supply Department and on the 1st July the Medical Division was formed and the existing procurement organisation was transferred physically to the block of offices occupied by the Supply Department. Therefore, the DGIMS took no further part in stores procurement and reverted to his normal duties of provisioning for civil requirements.

(27) The formation of the Medical Division created a somewhat difficult position in regard to the storage of raw materials. Metals which were, of course, quite alien to the stocks normally held in the Medical Store Depots had to remain in these depots despite the fact that they were the property of the Supply Department. The DGIMS required all available space for the storage of fabricated medical stores not only for his own civil requirements but also for the Central Provision Office (EGSC). The DGIMS, therefore, urged the Supply Department to remove their stocks of raw material from the Medical Store Depots at the earliest possible moment. No immediate action on this request could, however, be taken as (i) it was not customary for other directorates of the Supply Department to carry stocks, and (ii) storage accommodation was not easily available at that time. Subsequently, however, the North-Western Railway, Moghalpura, consented to take over stocks of raw material available with the Medical Store Depot, Lahore and the

transfer of stocks was effected between September 1944 and January 1945. Since then the North-Western Railway has acted as the stock holder for Medical Division raw material stocks in Lahore. It was not found possible to take over physically the stocks held by the Medical Store Depots at Bombay, Calcutta, Raipur and Madras but as Raipur had ample accommodation for the stocks held there and as also stocks held in Bombay, Calcutta and Madras were comparatively small, the DGIMS did not press for the physical transference of these materials.

More Comments on Surgical Instrument Production

(28) Reverting once again to the activities of the Control Officer (Surgical Instrument Development) it can be said that considerable improvement was made in the manufacturing facilities of a number of Sialkot firms during 1943. The Control Officer had also established a branch office in Bombay and a few firms in that area were developed on similar lines to those in Sialkot. The production of instruments increased both in quantity and quality. The Control Officer was finding it increasingly difficult to depend on the quality of indigenous steel which was now being used in the absence of imported material. The initial stock of imported stocks taken over from the custody of enemy firms was to all intents and purposes finished and whilst Indian made steels were being successfully used, all material issued to manufacturers by the Control Officer had to be very carefully examined for rolling defects and inconsistencies in analysis, before issue. Even these examinations did not always result in satisfactory steel being issued and it quite frequently happened that after the manufacture of instruments had commenced with one batch of steel, this was found to be defective and replacement had to be arranged. Another difficulty with which the Control Officer had to contend was the poor quality of nickel-plating being carried out by Sialkot firms. Quality nickel-plating eventually became a very serious issue and an expert on nickel-plating was, therefore, deputed by the CGI to investigate and improve the quality plating. This Officer subsequently recommended that the nickel-plating of instruments be concentrated in Lahore at the works of Messrs. Khosla & Co. and that the Sialkot firms should thereafter manufacture instruments up to the plating stage only. This scheme was carried out despite the complications it caused to purchase branches of the Medical Division, but on the whole the plating did not materially improve and it was eventually decided to revert to the practice of buying the finished instruments from Sialkot firms after improving their nickel-plating facilities and instituting a method of inspection calculated to reduce the number of badly plated instruments accepted.

(29) Despite the improvements in the quality of instruments which had undoubtedly been made since the Control Officer took over his charge in February 1943, complaints continued to be made by various demanders. After the Surgical Instrument Committee had sat in November 1942, a great many different types of instruments, previously manufactured in India, had been diverted to the U.K. and consequently only simple instruments required in large quantities were then being manufactured in India. Instruments

of complicated or delicate design were being imported by the Supply Department on behalf of the DMS and various other demanders.

Transfer of Responsibility for Importation of Medical Stores to the DMS and Formation of Technical Advisory Committee

(30) Early in 1944 general dissatisfaction with the position of supplies not only of indigenous instruments but of other items as well, including drugs, culminated in the DMS announcing his intention to import direct the greater part of his future requirements. This announcement caused a sensation as it was held that it was not correct for more than one department of Government to import from U.K. The whole question was taken up at a very high level and on the 30th May, His Excellency the Viceroy himself approved of the transfer of responsibility for importing medical supplies from the Supply Department to the DMS. The responsibility for importing medical stores became that of the DMS on 24th June 1944 but at the same time it was decided that before indents were placed on U.K. by the DMS a technical and screening sub-committee should sit to decide upon the items in the PVMS which would thereafter be imported. The committee formed was a Supply Department Committee under the chairmanship of the Deputy Director General in charge of the Medical Division. The DMS and the DGIMS were also represented on the Committee. The committee was charged to classify all medical stores into the following categories:—

(i) Stores wholly imported, that is, not manufactured at all in India;

(ii) Stores which can be manufactured in India but which it would be better to import as finished articles for technical reasons or because the greater part of the materials have to be imported; the " greater part " would be interpreted as meaning that over 50 per cent of the materials were imported materials;

(iii) Stores which can be manufactured in India, but requiring imported raw materials up to 50 per cent;

(iv) Stores manufactured in India wholly from Indian raw materials.

(31) The work of this committee, in so far as surgical instruments were concerned, resulted in many other items previously made in India being diverted to the U.K.

(32) The work of producing instruments against outstanding contracts proceeded very satisfactorily thereafter until April 1945 when new contracts against 1945 requirements were negotiated with Sialkot firms and orders were placed.

(33) Shortly after the cessation of hostilities in the West, considerable embarrassment and contractual difficulties were caused by an announcement from the DMS to the effect that whilst he had been prepared to accept other than the best surgical instruments during war years when the best were not available, he could no longer consent to do so now that the war in the East was ended and supplies of superior quality instruments were available from the U.K. He had, therefore, decided to divert the majority of demands previously placed on the Supply Department to the U.K. and that this being the case,

Supply Department was requested to arrange cancellation of any orders which may have been placed against 1945 demands.

(34) A strong protest against this unilateral treatment on the part of the DMS was made and it was pointed out that the cancellations of these contracts so shortly after they had been placed would involve Government in the payment of heavy compensation. It seemed, however, that the DMS's action represented the culminating point brought about by the complaints made from time to time in regard to the quality of Indian made surgical instruments to effect cancellations of the majority of outstanding orders with Sialkot firms.

(35) The 31st July, 1945, virtually marked the end of surgical instrument production in India on the vast scale necessary for the Defence Services. Since then the Office of the Control Officer (Surgical Instrument Development) and the Medical Stores Inspection Depot at Sialkot have ceased to exist and steps are now being taken to dispose of the raw materials held by the Supply Department in Sialkot, which are now considered to be surplus to the Supply Department's requirements.

(36) Plant and machinery which were latterly installed by the Control Officer (Surgical Instrument Development) with the object of manufacturing the more delicate instruments and helping the industry to achieve a better standard of quality are now in the process of being taken over by the Director of Industries, Punjab, and it is not improbable that the Supply Department's raw materials, mentioned above, will eventually be purchased by the Punjab Government for the purpose of subsequent issue to the industry in Sialkot area.

(37) As will be seen from Annexure II instruments to the value of Rs. 64·21 lakhs have been supplied by the industry in India since the Supply Department took over the responsibility for procurement and, in spite of the fact that the complaints in regard to quality have been numerous and bitter, it is certain that the industry's contribution towards the war effort has been appreciable. The Control Officer and the instrument makers themselves have been handicapped by the inconsistencies of Indian made steel and if steel of reliable quality had been available during these war years, the industry's output would have been greater and more satisfactory in all respects.

More Comments on the Production of Appliances, Miscellaneous Medical Stores and Metal Containers

(38) The production by the CGI of specifications and drawings to govern the design and quality of appliances, miscellaneous medical stores and containers resulted in a much higher standard of stores being supplied and also enabled the Instruments and Appliances Directorate to plan ahead with reasonable accuracy the quantities and sizes of raw materials necessary for the production of such stores.

(39) The appointment of an experienced Mechanical Engineer —Mr. A. E. Howell—formerly DCME of the North Western Railway, to the post of Officer on Special Duty (Appliances) also resulted in a larger ouput.

(40) There were, of course, delays in production due to lack of transport for raw materials, failure on the part of contractors to deposit the value of materials promptly, difficulty in obtaining the Inspectorate's final approval of advance samples and other minor causes but it can be said that on the whole the production of these items proceeded satisfactorily throughout the war years.

(41) In this respect Annexure II and III will be found interesting and it will be seen from Annexure II that whereas the value of surgical instruments supplied was Rs. 64·21 lakhs, the total value of appliances, miscellaneous medical stores and metal containers produced during the same period was Rs. 136·41 lakhs.

Cancellations after the Cessation of Hostilities and their Effects on Raw Material Stocks

(42) Cancellations of all types of demands began to filter through shortly after A.D. day. These increased as the war with Japan drew to a close and after V. J. day the cancellations became very heavy indeed. These cancellations resulted in a considerable quantity of raw material which would have been used against 1943 demands becoming surplus and when the majority of 1946 demand were also cancelled these surpluses of raw material increased still further.

(43) Including the material held in Sialkot for surgical instrument production, the Instruments and Appliances Directorate have already declared raw materials to the value of 7·37 lakhs as being surplus to requirements. Materials to the value of Rs. 1·33 lakhs still remain undeclared as surplus, as a greater part of this material is under issue to contractors against contracts which are still outstanding. A number of these contracts are likely to be cancelled. If and when these cancellations are effected further quantities of raw material will be declared as surplus.

(44) As the greater part of these surplus stocks of raw material can be readily used for both medical stores and other purposes and are urgently needed by numerous firms wishing to convert their factories from war time to peace time production, it is thought that the loss to Government when these materials are finally disposed off will be negligible.

(45) Annexure IV gives some indication of the types of material which have been handled by the Instrument and Appliance Directorate and shows the approximate total value of materials purchased and issued to contractors. In addition, large quantities of brass sheet and Mild Steel (of sizes other than those stocked by the Medical Division) have been released to contractors by licence.

E. T. IBBITT

Deputy Director of Planning (Technical).

26th May 1948.

ANNEXURE I

Terms of Reference of the Committee

(1) To decide what the Inspection Standard should be.

(2) To draw up a list of surgical instruments and appliances which should, in future, be wholly imported.

(3) To draw up a list of surgical instruments and appliances which should be made in India by specified firms.

(4) To indicate what items in the list of instruments and appliances to be imported could be considered for development of production in India by selected firms.

ANNEXURE II

Statistics showing the Number of Demand Items Planned in the Directorate and the Value of Deliveries made Between October 1941 and 31 December 1945

1. Number of demand items planned in the Instruments and Appliances Directorate (i.e. instruments, appliances, miscellaneous medical stores and containers). .. .. .. An average of approx. 400 per month	20,000 (approx.)
2. Value of deliveries made:—	
(i) *Surgical Instruments* (i.e. Sections 05, 06, 07, 09, 10, 24 and 27 of the PVMS less the value of seven items of appliances included in Section 05) ..	64·21 lakhs
(ii) *Appliances and Miscellaneous Medical Stores* (i.e. Sections 03, 04, 08, 11, 14, 15 ,16, 19 and 21 of the PVMS, plus the value of seven items in Section 05)	106·79 lakhs.
(iii) *Metal Containers* (i.e. Section 23—Metal containers only) ..	27·50 lakhs.
Square 1 gallon tinplate containers fabricated by Burmah Shell, Madras. Value including the approx. cost of raw materials which were supplied free of charge	2·12 lakhs.
	200·62 lakhs.

ANNEXURE III

Notable Items of Appliances Supplied by Indian Manufacturers from 1 November 1941 to 31 December 1943

P. V. No.	*Article*	*Value of deliveries made. Rs.*
03021	Castor, tables, instrument and other 1-½″ tubular furniture, for	1,55,301
03076	Stand for three 2-gallon reservoirs jars, complete	47,995
03077	Stand, wash, for two basins, complete ..	9,987
03078	Stand, wash, for two basins portable, with folding or jointed legs, complete	83,764
03126	Table, operation	24,375
03127	Table, operation, folding	94,515
03133	Table, operation, St. Bartholomews Hospital pattern, model A, complete	45,100
03146	Trolley, ward, 27″ × 18″ complete ..	1,83,830
05714	Steriliser, steam, high pressure, drum deep, for	47,725
05713	Steriliser, steam, high pressure, complete ..	5,36,426
05715	Steriliser, steam, high pressure, drum shallow, for	66,563
08216	Fully, for balkan beam	37,130
08266	Splinting, wire, (Cramer's) 160 cm. × 10 cm. ..	63,561
08267	Splinting, wire (Gramer's) 60 cm. × 8 cm. ..	56,186
08286	Splint, femur (Bohler's) 4 pulley modification (Braun's)	52,542
19070	Sprayer, hand, anti-insect	7,88,116

ANNEXURE IV

Statistics relating to the Purchase and Distribution of Raw Materials for Surgical Instruments, Appliances, Miscellaneous Medical Stores and Metal Containers

The following materials and tools were purchased, stocked and issued under the direction of the Instruments and Appliances Directorate:—

For Instruments	Carbon Tool Steel, High Speed Steel, Stainless Steel Twist Drills, Taps, dies, stocks & tap wrenches, Files, nickel (for plating) " Peerless " Polish, " Lustre " Trichlorethylene, screws, milling cutters, Pyrometer equipment.
For Appliances, Misc. Medical Stores and Metal containers	Brass Sheets and ingots, gun metal ingots, copper sheets & rivets, mild steel bars, rods, angles, and wire, galvanised plain sheets and Wire, Tin plates, Terneplates and "P. C. R. C. A." sheets, W. I. Pipes, Tin ingots, Solder.

Book value of raw materials purchased between 1-1-42 and 31-12-45	Rs. 27 lakhs (approx.)
Value of issues made to contractors on payment at *approved issue prices* (between 1-1-42 and 31-12-45)	Rs. 13·10 lakhs ,,
Value of issues made to contractors free of charge (this value has been calculated *at approved issue prices*) between 1-1-42 and 31-12-45)	Rs. 9·23 lakhs ,,
Book value of materials declared as surplus to the Disposals Directorate since V. J. day and book value of materials remaining undeclared as surplus	Rs. 8·70 lakhs ,,

APPENDIX XII

No. Z-21632/1(D.M.S. 2(a)).
Government of India,
(Defence Department).
New Delhi, the Nov., 1940.

To

The Adjutant General in India.

Subject:—Raising of Additional Medical Units

Sir,

The Governor General in Council sanctions the raising of the following units to complete deficiencies in field medical units to meet existing liabilities of the Army in India during the present emergency:—

Unit	Number	Cost of equipment			
		Ordnance and clothing Rs.	M.E.S. Rs.	Medical Rs.	Total Rs.
A. *Debitable to Indian revenues*					
Field Ambulances	13	3,74,465	1,690	1,22,980	4,99,135
Field Hygiene Sections	8	87,200	1,480	31,200	1,19,880
Casualty Clearing Stations	4	1,95,160	12,936	40,240	2,48,336
British Staging Sections	1	9,625	850	2,000	12,475
Indian Staging Sections	4	27,304	3,400	8,000	38,704
Depot Medical Stores	2	3,530	160	81,800	85,490
British Convalescent Depot	1	2,400	27,000	1,070	30,470
Indian Convalescent Depot	1	2,550	18,480	1,070	22,100
X-Ray Units	10	4,100	300	1,00,000	1,04,400
Mobile X-Ray Units	7	11,550	210	56,000	67,760
Anti-malarial units	4	2,000	430	8,040	10,470
Motor Ambulance Sections	20	2,71,920	..	10,600	2,82,520
General Hospitals—					
Headquarters	13	97,450	99,140	1,13,360	3,09,950
British Sections	14	2,08,480	1,17,940	43,120	3,69,540
Indian Sections	95	10,68,750	7,06,420	2,92,600	20,67,770
Total		23,66,484	9,90,436	9,12,080	42,69,000
B. *Debitable to H. M. Government*					
Ambulance Trains	6	15,060	880	21,840	37,780
General Hospitals –					
Headquarters	8	59,970	61,000	69,760	1,90,730
British Sections	28½	4,63,790	2,40,000	87,780	7,91,570
Indian Sections	4	45,000	29,740	12,320	87,060
Total		5,83,820	3,31,620	1,91,700	11,07,140

2. The estimated cost.
(A) Rs. 42,69,000 is debitable to
(B) Rs. 11,07,140 is debitable to

I am etc.
Secy. to the Government of India.

APPENDIX XIII

Medical Stores Budget (Military)

1942-1943

1. The budget figures shown hereunder include the estimated cost of the following items:—

Medical stores obtained from or through the DGIMS on behalf of all troops under the administrative control of the C-in-C India.

Medical Stores obtained from or through the DGIMS *by manufacture or purchase in India* on behalf of the CPO.

X-Ray and electro-medical appliances and stores as above.

Veterinary stores as above, except that special provision has not been made for CPO requirements.

Biological Reagents manufactured at or obtained through Laboratories under the control of the DMS.

For the purpose of dividing the cost of X-ray stores between India and overseas it has been assumed that all initial X-ray and electro-medical apparatus will be purchased under the Lease and Lend Act but that all maintenance stores will be obtained from firms in India.

2. The budget estimates are reported under the following heads:—

a. *Troops in India*
   (i) Stores purchased or manufactured in India.
   (ii) Stores obtained from the U.K. or overseas countries.

b. *Troops overseas*
   (i) Stores purchased or manufactured in India.
   (ii) Stores obtained from the U.K. or overseas countries.
   (iii) Stores purchased or manufactured in India for the CPO.

c. *Initial equipment for new units*
   (i) Stores purchased or manufactured in India.
   (ii) Stores obtained from the U.K. or overseas countries.

d. *Reserves*
   (i) Stores purchased or manufactured in India.
   (ii) Stores obtained from the U.K. or overseas countries.

e. *Anticipated purchases under the Lease and Lend Act*

3. METHOD OF CALCULATION OF FIGURES SHOWN UNDER ABOVE HEADS

A. *Troops in India*

At peace wastage rates

Total cost of " Maintenance Figure " multiplied by 10 (i.e., Co-ordination factor), multiplied by 12 (i.e., number of months).

plus

At war wastage rates

Total cost of " War Wastage Figure " multiplied by 3 (i.e., Co-ordination factor for troops on war wastage in India), multiplied by 12 (i.e., number of months).

B. *Troops overseas based on India*

Total cost of " War Wastage Figure " multiplied by 7 (i.e., Co-ordination factor for troops on war wastage overseas), multiplied by 12 (i.e., number of months).

Troops overseas supplied by the CPO

Total cost of " War Wastage Figure " multiplied by 13 (i.e., Co-ordination factor for troops overseas), multiplied by 12 (i.e., number of months).

C. *Initial equipment for new units*

Total cost of:—	*Imported* Rs.	*Indigenous* Rs.
2+16 Field Ambulances at Rs. 1940, Imp. and Rs. 7,260, Ind.	34,920	1,30,680
4 Light Field Ambulances at Rs. 1,950 Imp. and Rs. 7,260 Ind.	7,760	29,040
12+20 Field Hygiene Sections at Rs. 5 Imp. and Rs. 390 Ind.	160	12,480
1 Armoured Division Field Hygiene Section at Rs. 320 Ind.	..	320
67+35 Indian Staging Section at Rs. 495 Imp. and Rs. 955 Ind.	50,490	97,410
33+14 British Staging Sections at Rs. 495 Imp. and Rs. 955 Ind.	23,265	44,885
41+30 General Hospital Headquarters at Rs. 11,955 Imp. and Rs. 16,835 Ind.	8,48,805	11,95,285
450+169 General Hospital Sections at Rs. 660 Imp. and Rs. 1,260 Ind.	4,08,540	7,79,940
4+6 British Convalescent Depots at Rs. 945 Imp. and Rs. 575 Ind.	9,450	5,750
8+12 Indian Convalescent Depots at Rs. 945 Imp. and Rs. 575 Ind.	18,900	11,500
2+8 Depots of Medical Stores at Rs. 78,580 Imp. and Rs. 73,060 Ind.	7,85,800	7,30,600
10+20 Field Laboratories at Rs. 2,400 Imp. and Rs. 2,200 Ind.	72,000	66,000
142+7 Dental Surgery Units at Rs. 825 Imp. and Rs. 1,540 Ind.	1,06,425	2,29,460
7+38 Dental Mechanic Units at Rs. 985 Imp. and Rs. 615 Ind.	44,325	27,675
13+13 Casualty Clearing Station at Rs. 8,195 Imp. and 14,870 Ind.	2,13,070	3,86,620
9 Anti-Malarial Units at Rs. 2,420 Imp. and Rs. 310 Ind.	21,780	2,790
3 Hospital Ships at Rs. 4,765 Imp. and Rs. 15,595 Ind.	14,295	46,785
3 Hospital Ship reserves at Rs. 3,570 Imp. and Rs. 5,700 Ind.	10,710	17,100
7+20 Ophthalmological Units at Rs. 1,040 Imp. and Rs. 2,075 Ind.	28,080	56,025
7+20 Ear, Nose and Throat Units at Rs. 1,435 Imp. and Rs. 2,270 Ind.	38,745	61,290

	Imported Rs.	*Indigenous* Rs.
40 Mobile Surgical Units at Rs. 3,340 Imp. and Rs. 5,015 Ind.	1,23,600	2,00,600
138+24 Regimental Units (full) at Rs. 205 Imp. and Rs. 940 Ind.	33,210	1,52,280
77 Regimental Units (modified) at Rs. 80 Imp. and Rs. 475 Ind.	6,160	36,575
10 Regimental Units (Special) at Rs. 2,245 Imp. and Rs. 2,660 Ind.	22,450	26,600
6 Dermatological Units at Rs. 230 Imp. and Rs. 1,030 Ind.	1,380	3,180
1 Base Depot of Medical Stores at Rs. 2,35,740 Imp. and Rs. 2,19,180 Ind.	2,35,740	2,19,180
45 R. A. F. Squadrons at Rs. 1,465 Imp. and Rs. 1,380 Ind.	65,925	62,100
7 Ambulance Trains at Rs. 425 Imp. and Rs. 1,900 Ind.	2,975	13,300
27 Motor Ambulance Sections at Rs. 7 Imp. and Rs. 925 Ind.	189	24,975
2 Orthopaedic Coaches (48 beds) at Rs. 75 Imp. and Rs. 1,235 Ind.	150	2,470
1 Orthopaedic Coach (16 beds) at Rs. 45 Imp. and Rs. 670 Ind.	45	670
41 Peace Hospital Sections at Rs. 11,955 Imp. and Rs. 16,235 Ind.	4,90,155	6,90,235
205 Peace Hospital Sections at Rs. 660 Imp. and Rs. 1,260 Ind.	1,35,300	2,58,300
10 Sick Bay sets at Rs. 1,010 Imp. and Rs. 1,200 Ind.	10,100	12,000
50 Supplementary Sick Bay sets at Rs. 470 Imp. and Rs. 320 Ind.	23,500	16,000
15+20 X-Ray Units at Rs. 900 Ind. ..	..	31,500
13+7 Mobile X-Ray Units at Rs. 820 Ind. ..	..	16,400
Total initial equipment	38,98,399	56,98,000
Plus		
3 per cent. Repair margin	1,16,952	1,70,940
	Imported	Indigenous
Total initial equipment	40,15,351	58,68,940
	Imported	Indigenous
Grand Total Initial Equipment ..	80,30,702	1,17,37,880

D. *Reserves*

Say five divisions at five months reserves each = 25 times the cost of the " Divisional Maintenance Figure ".

E. *Purchases under the Lease and Lend Act*

All initial non-expendable X-ray and Electro-Medical equipment.

15+20 X-Ray Units at Rs. 21,600	Rs.	7,56,000
13+7 Mobile X-Ray Units at Rs. 18,180 ..		3,63,600
		11,19,600
Plus 3 per cent repair margin ..		33,588
		11,53,188
(say)	Rs.	11,55,000

4. BUDGET FIGURES

			Rs.
(a) Troops in India			
	(i) India	(a) Medical Stores	2,73,60,000
		(b) X-Ray Stores	6,84,000
	(ii) Imported	(a) Medical Stores	1,92,00,000
(b) Troops overseas based on India			
	(i) India	(a) Medical Stores	3,02,40,000
		(b) X-Ray Stores	7,56,000
	(ii) Imported	(a) Medical Stores	4,03,20,000
(c) Troops overseas supplied by CPO			
	(i) India	(a) Medical Stores	5,61,60,000
		(b) X-Ray Stores	14,04,000
(d) Initial equipment			
	(i) India	(a) Medical Stores	40,15,000
	(ii) Imported	(a) Medical Stores	58,69,000
(e) Reserves	(i) India	(a) Medical Stores	30,00,000
		(b) X-Ray Stores	75,000
	(ii) Imported	(a) Medical Stores	40,00,000
(f) Lease and Lend	(i) Imported	(a) X-Ray Stores	11,55,000

5. SUMMARY

India		
Total purchases in India	Rs.	6,61,30,000
Total purchases from overseas ..	Rs.	6,93,89,000
Total purchases under Lease and Lend ..	Rs.	11,50,000
Grand Total India	Rs.	13,66,69,000
CPO		
Total purchases in India	Rs.	13,24,44,000
	Rs.	13,24,44,000
Budget total	Rs.	26,91,13,000

Sd./-
Lt.-Colonel
ADMS(M)
20-11-1941

DFA(O)
DGIMS
CPO (Med. Branch)
U.O. No. 3115/DM.S.2(b)

APPENDIX XIV

A Summary of Problems and Difficulties met with by the DMS in India in connection with the Supply of Medical Equipment and Personnel (1937–1941)

By

COL. H. HORAN BROWN, DY. DIRECTOR, MEDICAL ORGANISATION FOR WAR—1937–1941

The Departments dealing with stores and personnel in the office of the DMS in India were known as DMS 2(a), DMS 2(b), DMS 2(c) and DMS 4.

D.M.S. 2(*a*):—

- Artificial limbs and appliances:—
- Contract for the supply of—
- Periodical returns

Equipment:—

- British and Indian Military Hospitals
- Military Families Hospitals
- War Medical Units, including Ambulance Trains and Hospitals
- Headquarters and Regimental Units:—
- Scales of Medical equipment for—

Forms:—

- Pertaining to sections

Medical Comforts:—

- Scales of War Medical Units

Publications:—

- Field Service Manual (Medical) Mobilization
- Regulations. Field Service Pocket Book (I) F. S. Regs.
- Additions for India: Sections affecting Medical Services
- Equipment Regulations (I) Part 2 Section V and V.D. Military Hospitals and Miscellaneous medical charges
- Barrack and Hospital Schedules Section ' L '
- Equipment tables medical units
- Reports and returns:
  - Progress reports showing the state of expansion

Medical measures:

- Half yearly Inspection reports on units in Medical Mobilization store charge

Transport A.T. and M.T.

- Questions affecting War Medical Units

D.M.S. 2(*b*):—

Medical Stores for War:

(Comprising hospital stores and equipment, vaccines and sera, anti-gas medical stores and equipment)

For all units—Medical and non-medical in India:

(a) Provision-Maintenance, Reserves and Replacements (Including expansion units and for Overseas Forces based on

India—This includes Indigenous stores for the Middle East)
(b) Indents to cover all requirements of (a)

D.M.S. 2(*c*):—

Radiography

Budget expansion programme, replacement programme, reserve stores, indents, purchase and supply of films. Chemicals and apparatus. Accounts, statistics, contracts, books and forms.

D.M.S. 4:—

Co-ordination of all War Policy questions affecting the Medical Services
Medical organization for War
Raising of medical units for training
Mobilization of Medical Units
Policy for expansion
Replacement programme
Mobilization Plans
Command Mobilization Schemes
Progress reports on raising of medical units for War
War wastage
Modernization and Mechanization
War Diary

In the first place the adequate supply of personnel to meet the various commitments was by no means an easy proposition during the war. It necessitated moves of Medical Officers, Assistant Surgeons, Nurses, Sub-Assistant Surgeons and Indian Hospital Corps personnel between Commands, and the DMS had also to arrange for the recall of Medical Officers, Assistant Surgeons and Sub-Assistant Surgeons from the civil side of the IMS in accordance with pre-arranged plans—as the latter could of course not be recalled at once, otherwise there would have been considerable dislocation of work on the civil side. Various forms had to be printed and the necessary moves in each Command, showing when these moves would take place and where personnel should be posted had to be worked out. The forms were issued to Commands to enable them to plan ahead. In 1938, Recruiting Conferences were held at G.H.Q. to consider the supply of personnel and also the question of Reserves. These conferences continued at intervals.

In 1939 also staff requirements were reviewed. Arrangements had to be made for Administrative Officers and Commanding Officers when necessary.

New war establishments were also considered.

The DMS had only Cavalry and Infantry Field Ambulances, and a War Establishment for a Light Armoured Field Ambulance was prefaced to work with the new Armoured Brigades and Divisions. Small models were most useful in this case, as one could see the unit in miniature.

Certain modifications had to be made in the light of experience. In 1939 also conferences of Commanding Officers of I.H.C. Companies were held, and these took place at intervals, from this time onwards.

The Army increased very materially and heavy demands were made for personnel. These questions were dealt with by the Personnel Section at Medical Directorate. The IHC Commanders had difficulty in meeting the demands owing to the short time available for training. Overseas Forces of course had the pick and hospitals continued their training. In 1938 a Medical and Veterinary Sub-Committee was formed and met regularly to consider all questions of Medical Veterinary Stores. At a later date the question of substitutes was examined. The possibility of procuring as much as possible from local sources was constantly under review, as the time lag of stores from the United Kingdom increased with the increasing difficulty in the European Theatre of War.

The demands for Medical Stores and Equipment were placed with the Director General, IMS who was responsible for their supply in the first instance. The questions of the supply of Vaccines and Sera were constantly under review. In the matter of supplies of all medical equipment to the Defence Forces close liaison was maintained with the office of the DGIMS.

A Committee was held in the Medical Directorate to revise Medical Mobilization Equipment scales of all Units, Medical and Non-Medical soon after the commencement of the war. Red Cross requirements were also considered. Alterations were made in the arrangement of Medical Stores and equipment of General Hospitals. Previously a General Hospital had five sections with equipment spread over the various sections. This made it difficult to increase or decrease the General Hospitals as required. The new arrangement made all sections exactly similar and Operating and Special equipment was kept as a separate unit. In this way, General Hospitals could be increased or decreased quickly as required. In Section DMS 2 (b), lists were made out showing the requirements of a Division for one month. This saved considerable time when stores were required, as one-two three, etc., etc., months requirements could be issued without any trouble for a Division or more. The Equipment for Field Ambulances was reviewed and new schedules were made out.

When war broke out some units were on the old and some on the new scale. This was difficult but could not be helped owing to questions of finance. Arrangements had also been made to re-equip the Specialists Departments throughout India—Ear, Nose, Throat and Ophthalmic. This again could only take place gradually on financial grounds. In consultation with the Engineers Branch modifications of the General Hospital equipment were considered as too cumbersome.

A new Ambulance Train was planned as the train then in use was considered as out of date. The new Train was available in 1941 and others followed.

X-ray Equipment: A review of the position regarding Military X-ray Departments would be incomplete without reference to previous history of the supply of the equipment.

Up to April 1930, all X-ray stores were supplied to Military X-ray Departments by the X-ray Institute, Dehra Dun. The Officers-in-Charge, X-ray Departments, forwarded their indents to the Institute and a consolidated indent was placed on the Director General, Indian Stores Department, London.

This unsatisfactory system gave the various X-ray Specialists and others a free hand in the matter of ordering equipment and the resultant varieties of types can be well imagined. The X-ray Institute, Dehra Dun, closed in 1930 and the DMS took over the responsibility for the supply of all X-ray apparatus, accessories, films and chemicals for the Military X-ray Departments, and was empowered to enter into contracts with firms, for the provision of materials up to the full extent of his budget allotment. D.M.S. 2(c) was responsible for this department. An allotment was made for the X-ray budget to modernise all the X-ray Departments, but during the financial 'blitz' of 1932-33 the amount had to be reduced, resulting in a slowing down of modernisation. X-ray Departments were provided with new equipment of a standard pattern and self-protected X-ray tubes within the limits allowed. Some 60 per cent was required annually for maintenance in films and chemicals alone. We endeavoured to modernise units on the balance, and at the same time attempted to open new X-ray Departments which were urgently required. Despite the financial restrictions which considerably retarded the provision of new equipment, the year 1937 saw most Military X-ray Departments in operation with new equipment and standard accessories, and it had been possible to provide similar modern equipment to War X-ray units.

From 1938 onwards the process of equipping X-ray Departments with new equipment was carried out. The following were provided:—

(a) Portable X-Ray sets
(b) New shock-proof units
(c) A complete new installation
(d) Electro-medical apparatus in two cases
(e) Reserves of Uro-selection B, etc.
(f) Reserves of X-Ray stores from Siemens
(g) A new shock-proof plant
(h) Two installations for Hospital ships
(i) New installations for seven stations
(j) New Siemens 400 m.a. plant for Poona

In 1939, the DMS was asked to supply an X-ray unit for Middle East and this was done funds being provided for a replacement. The 'Expansion' programme was drawn up, providing for ten X-ray units and seven Mobile X-ray Units, and orders were placed for the equipment. Two sets were provided by the 'Ladies of Trivandrum', and were installed—one at Bombay and one at Karachi. Local War funds also provided a set for Calcutta.

To maintain all these with films and chemicals, which were imported stores, represented a problem which was difficult of solution if wastage was to be avoided, as no X-ray Unit in the field could hope to have facilities anywhere approaching the ideal for film storage, nor could the consumption of films be estimated with any real degree of accuracy, since this depended on 'Operations' to a very much greater extent than providing X-Ray facilities for the normal sick who might be admitted to a Hospital or Casualty Clearing Station. Steps were taken to ask for all available information and to increase reserves held by Messrs. Kodak and Ilford in their air-conditioned store rooms.

The possibility of an X-Ray unit being required for overseas was envisaged as early as 1938 and provision of funds was then made for the purchase of a generating set—the reason being that, an X-Ray unit, unlike a Mobile X-Ray unit, is helpless if the location of the General Hospital to which it is attached is in a place without an electric supply.

For the supply of films and chemicals, contracts were made with Messrs. Kodak Ltd. and Ilford—Selo Ltd., Bombay, for storage of our reserves from which issues were made to hospitals, and replacements made by the firms thus effecting turnover of stocks. Alternative schemes for storage under military arrangements were considered but none of these proved satisfactory solutions to the problem of ideal storage.

Ambulance Trains: In 1940, the Ambulance Trains then in commission were not considered satisfactory, permission was received from the Adjutant General and the Director of Medical Services to plan a New Ambulance Train. The details were worked out with the Railway Board. The new Ambulance Train was designed to carry 216 lying cases—All British—All Indian—or both combined.

The layout and marshalling order of the train was as follows:—

Engine—1st Coach	4 War Servants	Staff
	4 Sweepers	
	2 Bhisties	
	Latrine	
	Bath	
	4 Cooks	Staff
	Head Cook	
	Hindu Kitchen	
	Mohammedan Kitchen	
	Guard	
2 Coach	8 I.O.Rs.—Staff Bath and Latrines	
	4 Private servants	
	Store.	
3-8 Coaches (both inclusive)	28 Patient	
9th and 10th Coaches	Washplace	
	8 I.O.Rs.—Sick	
	16 Sick Officers	
11th Coach	British Kitchen	
	Kitchen store	
	Dining room for 8	
	RAMC Sergent	
	Assistant Surgeon IMD	
	Bath and Lavatory	
12th Coach	Officer	
	Medical Officer	
	Bath and Lavatory	
	Medical Officer	
	Bath and Lavatory	

	Two Nurses Dining room for 4
13th Coach	Guard Water tank 6 B.O.Rs.—Staff Bath and Lavatory Sub-Assistant Surgeon IMD Dispensary Medical Store.

From a perusal of the layout of the Train, it will be seen that the British Staff and Kitchen were at one end of the train and the Indian Staff and Kitchen at the other end. This facilitated work in case the train was carrying both British and Indian patients at the same time. When carrying sick and casualties, a fast traffic wagon was attached in the rear of the train outside the Guard's compartment for use as a Mortuary, if required.

The equipment included the following:

(i) Two kerosene operated refrigerators fitted in the Dispensary and British Kitchen cars.

(ii) 6 Bed rests per car.

(iii) Fire extinguishers in each vehicle.

(iv) 2 lockers per car under the bunks to open in front.

(v) Folding seats at the end of the Ward cars and at the end of the sick Officers cars for the convenience of Orderlies.

(vi) Bathrooms in the war cars were fitted with a combination of Indian and European type of Lavatory.

(vii) Taps were provided in the latrines for washing bedpans.

(viii) Six Book rests in each coach. Sockets were fitted to individual bunks to enable the book rests to be used where necessary.

(ix) Ice containers were also provided.

(x) Two sets of screens for each coach, and hooks were fitted round each bunk for screens if required.

(xi) A 40 gallon tank was provided in each coach for drinking water with space outside for ice packing, and one filter per coach.

The train was a corridor train.

The staff consisted of:—A Superintendent-in-Charge, with experienced clerks from each of the Departments—DMS 2(a) DMS 2(b), DMS 2(c), an Officer of the AG's Branch and clerks in DMS 4.

The staff in DMS 2(b) were increased later and another Officer was attached to help in that section.

Soon after 1941 the office of the Deputy Director Medical Organisation (War) was reorganised and that department then dealt only with medical store and equipment being redesignated as DDES (Deputy Director, Equipment and Stores).

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